VOL. XXVII NEW YORK—THURSDAY, NOVEMBER 14, 1912—CHICAGO No. 20

The AUTOMOBILE

English Car Tendencies for 1913

First Report of Annual Olympia Exhibition Which Opened in London, November 8—Fewer Car Models—Silent Chain Drive Universal—Wire Wheels Gain—Fewer Sixes

1913 Models Show Numerous Refinements in Lubrication, Suspension, Gearboxes, Clutches and Other Features—Statistics of British Car Industry for Present Season

By J. S. Critchley

LONDON, Nov. 2—*Special Correspondence* — One week from today the annual Olympia show will have opened its doors disclosing one of the greatest motor exhibitions which Europe has had an opportunity of witnessing. In all, 353 exhibitors are installed, this constituting a new record. There are 119 exhibitors in the complete car section; thirty-five body-builder exhibits; 150 accessories; eight press, and two associations.

Of these exhibits Great Britain has 45 per cent.; France, 23 per cent.; Germany, 10; Italy, 7; Belgium, 6; United States 6; Switzerland and Holland, 3, as may be seen in the accompanying diagram.

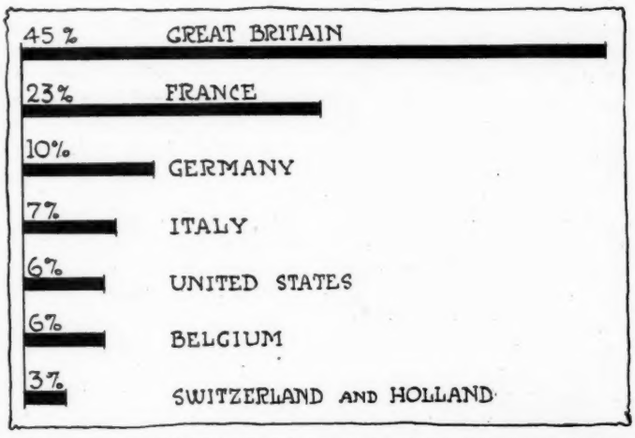


Diagram illustrating the percentage of the exhibitors representing the various countries whose manufacturers are displaying their products at the Olympia show in London. United States is fifth

Although the English manufacturers have been slower than usual in announcing their new models, it has nevertheless been possible to obtain an accurate estimate of the improvements that have been made by the different companies. All of them have had their new products out for months, but in not a few instances have kept the details as quiet as possible.

In a word, 1913 will not be a startling year. There is nothing radical offered. Contrasted with the shows of 2 and 3 years ago there is little in the way of sensations. Rather there has been a perceptible decrease in the use of certain constructions, which the experience of a year or two has tested; and, on the other hand, there is an equally perceptible tendency towards other constructions which have been well tried out during this period. Then, again, many of the standard constructions remain practically as they were during this season.

The six-cylinder motor has lost somewhat as compared with 1912. For next year there are twenty-two distinct six-cylinder models, whereas for 1912 there were twenty-six. The list shows one or two concerns that have discontinued six-cylinder construction, notably Adams, two Standard models, Crowdy, etc. The horsepower of the sixes listed for next year range from 23 in the small Star to 59.9 in the Napier. The popular rating is between 23 and 30. There is a slight reduction in the total number of models of all motor types for next year, showing that several of the concerns have reduced the number of models they are marketing, there being only one English company, namely, Vauxhall, which has increased its number of models.

The stroke-bore ratio leans slightly to an increase. This is particularly so in the new models. The maximum stroke, 160 millimeters, or 6.4 inches, is not found in many models, one being the 20.1-horsepower Sunbeam, with measurements 90 by 160; a stroke of 150 millimeters is used in four models with bores under 100 millimeters, namely, Sunbeam, 80 by 150; Calthorp, 80 by 150; Star, 90 by 150; and Vulcan, 80 by 150. A recent test of long-stroke efficiency was that of the Sunbeam, 80 by 150, on Brooklands, when in a 10-lap standing start an

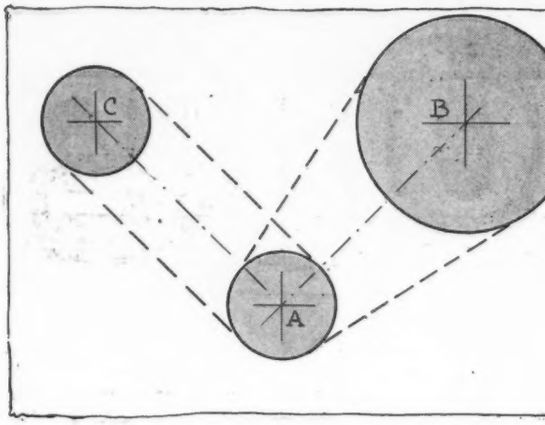


Fig. 1—Silent chain-drive scheme for camshafts where distance A-C does not exceed 7 inches

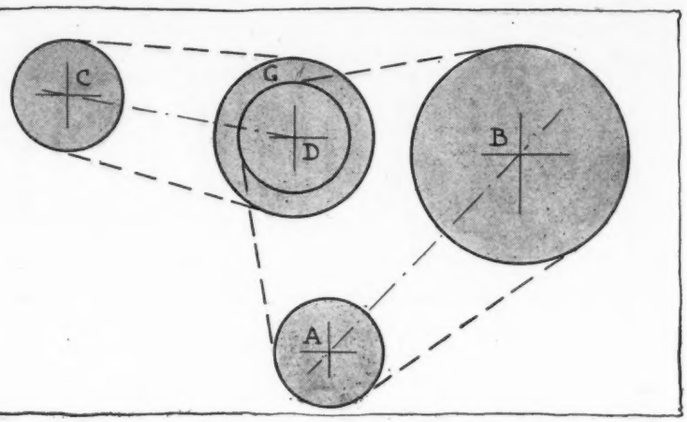


Fig. 2—Popular silent chain-drive arrangement where distance A-C exceeds 7 inches

average speed of 93.8 miles per hour was made, and in the flying half mile, 101.87 miles per hour. These engines tuned for racing purposes give slightly over 70 horsepower.

There have been few changes made in bore and stroke measurements of 1912 models which are continued for the 1913 market. In every case where a change has been made the stroke has been increased as the tabulation on page 326 showing the various 1912 and 1913 English models indicates. These stroke changes generally run as follows: From 120 millimeters to 130, from 100 to 120, from 110 to 120, from 110 to 130, from 115 to 130, etc.

Non-Poppet Situation

The non-poppet valve motor begins 1913 much as it began 1912 with the Knight type gaining in prestige. This is particularly the case on the Continent where Clément, Mors and Gregoire in France have decided to bring out Knight models; in Belgium where Germain has adopted it in addition to the Minerva, and in Germany where Dobey will manufacture it for next year in addition to Mercedes. Panhard will produce 80 per cent. Knight models for next season; Daimler in England builds it exclusively; the English Deasy will continue it in all models, but the Rover of England, which has used it this year in single and two-cylinder types, has discontinued these, and will use poppet valves in its two and four-cylinder 1913 models.

The Argyll motor with its single-sleeve valve will be produced in two models, namely, 80 by 120 and 110 by 130, the former being a new model. In this motor the junk ring in the head has been eliminated, with a resulting gain of reduced friction.

The Itala non-poppet type is being built in two sixes, 25 and 35 horsepower. This valve is a vertical rotating type, one valve serving as intake and exhaust for two cylinders.

Apart from these non-poppet types there is little change compared with a year ago. A great number of experiments have been carried out and many new engines tested or given long demonstrations, but the majority of them have been rejected. One that is now before the public is the improved Reno-Sphinx with its internal sliding valve. An English company has taken over the patents and has developed a neat design. The valve shaft is worm-driven from a vertically inclined shaft, the inclination being for the purpose of bringing the camshaft close to the cylinder walls thereby making the engine more compact. The engine is 90 by 130.

In reviewing the motor design tendencies, one is impressed with the great leaning towards increasing the number of crankshaft bearings, so that for next year the two-bearing shaft with a four-cylinder motor is rarely met with, one of the few examples being the new 10-12 Star model 80 by 120. There is not a perceptible tendency to increase the number of crankshaft bearings for a four-cylinder motor to more than three, but the shaft diameters are being increased, and the 40-millimeter shaft is quite common for a motor with an 80-millimeter bore. Die-cast white metal bearings are increasing; a few concerns adhere to the method of lining up gunmetal backings with bearing materials, and the Austin is one of the very few still using phosphor bronze.

The en bloc system of casting cylinders is decidedly on the increase, and in practically all recent designs is predominant. These cylinder castings are found in connection with the Wolseley, Star, Sunbeam, Vauxhall, Swift, Arrol-Johnston and Straker-Squire and many others.

Vauxhall is the only company which has increased the number of models for 1913 by the introduction of a four-cylinder 95 by 140. The practice adopted by this firm as regards bore-stroke ratio has been worked out not only on scientific lines, but also in connection with the many successes achieved by the Vauxhall cars on the racing track. In the O'Gorman trophy race held during last month the winning Vauxhall, 89.7 bore by 118 stroke, and with a piston swept volume of 2,983 cubic centimeters, achieved a remarkable record of an average speed of 92.5 miles per hour over a distance of 30 miles.

An examination of this list will indicate that there is a tendency towards the reduction of the number of models made by individual firms. For instance, the Wolseley company has ceased to construct its 79 by 120 model and the 100 by 130, and will in future construct only one four-cylinder model, namely, the 90 by 120 R. A. C. rating, 20 horsepower.

Prices show only slight alterations, and in only a few cases will any reduction be found.

Few Sixes for 1913

Referring to the six-cylinder models this class of car has been dropped entirely by the Standard company, which has hitherto constructed two sixes. No new six-cylinder models are projected, which is evidence that the six-cylinder car has not increased in popular favor. The prices in this class remain practically stationary, with a reduction of $50 in the case of the six-cylinder Sunbeam. The bore and stroke of this class also remain practically stationary.

The Daimler company will no longer build its 80 by 130 model, having increased the bore to 90 millimeters, whereas the Sunbeam company has, on the other hand, reduced the stroke of its 90-bore from 160 to 130 millimeters. This reduction in stroke is a notable modification, as hitherto the Sunbeam company has been the pioneer of the long-stroke engine. The change is probably due to the fact that the long-stroke engine is never quite so smooth in its running as the comparatively shorter stroke.

Undoubtedly the lack of popularity in connection with the six-cylinder cars is due to the improved controlability and silence of the four-cylinder models, which meet in every way the requirements of the average motorist.

There is no general disposition on the part of the manufac-

turers to rate their engines at any higher rating than they arrive at by the R. A. C. formula, in fact, in the majority of cases the manufacturers' ratings compared with the R. A. C. ratings are found to be at a slightly lower figure.

The method of driving cam and magneto shafts by means of chains introduced by Daimler in the Knight engine is now universally adopted. One of the most generally used arrangements is shown in Fig. 1, and has proved satisfactory in every instance where the chains have been of sufficient dimensions, and where the distance A-C does not exceed 7 inches. In this diagram two drives are shown from the crankshaft pinion, the wheel B being on the camshaft and wheel C on the pump or magneto shaft. The centers in connection with this arrangement should be fixed. An alternative arrangement, Fig. 2, which should be use where distance A to C exceeds 7 inches. In this case the crankshaft pinion A drives the camshaft wheel B by means of a chain running over the adjustable wheel D, mounted on a bracket which swings about the center of C, so that the centers of C and D are fixed, while adjustment is provided from the camshaft chain. The wheel G may be of equal size to the wheel C or larger according to the speed required at C. The adjustable axle of the wheels D and G may also be provided with suitable means for driving a fan. The width of chain to be employed for camshaft drives is governed by the bore, valve diameter, spring pressure, cam profile and the auxiliary drives from the camshaft such as oil, water pump and fan. Experiment has shown the best results are to be obtained from adopting the chain slightly shorter in its over-all length than is finally required, running in the chain on an adjustable jig mounted over wheels slightly smaller in diameter until the shortage above named has been taken out by the running in process. The result is that the component parts of the chain have by this process been allowed to settle down, such settling being caused in great measure by the initial sag of any chain.

The proportion of cars fitted with thermo-syphon is still in the majority, being well over 50 per cent. The well-known firms fitting pumps to all models are Austin, B. S. A., Talbot, Daimler, Deasy, Napier with its six-cylinder cars, Lanchester, Rolls-Royce, Sunbeam, Vauxhall and Wolseley. These firms have made no departure from their last year's practice. The six-cylinder Sheffield-Simplex 89 by 127; Crossley four-cylinder 101 by 139, and Humber 105 by 130 are probably the most powerful motors in the thermo-syphon list.

With regard to radiators, the honeycomb type is not so popu-

Comparison of Four- and Six-Cylinder Cars for 1912 and 1913

Name	1912 Bore and stroke	1913 Bore and stroke	Bore and stroke in inches	R.A.C. h.p.
Pilot	65 x 110	No change	2.56 x 4.33	10.25
Turner	60 x 100	No change	2.36 x 3.94	8.9
Swift	— —	65 x 100	2.56 x 4.33	10.25
Light Cars	65 x 110	Not made		
Light Cars	— —	75 x 120	2.95 x 4.72	13.9
Belsize	69 x 130		2.72 x 5.12	11.9
Arrol-Johnston	69 x 120	No change	2.72 x 4.72	11.9
Briton	68 x 120	No change	2.68 x 4.72	11.5
Star	68 x 120	Not made		
Star	— —	80 x 120	3.15 x 4.72	15.9
Humber	68 x 120	69 x 130	2.72 x 5.12	11.9
Austin	63 x 89	Not made		
Austin	— —	76 x 89	2.99 x 3.50	14.4
Calthorpe	69 x 125	No change	2.72 x 4.92	11.9
Enfield	76 x 120	No change	2.99 x 4.72	14.4
Alldays				
Vulcan	80 x 120	No change	3.15 x 4.72	15.9
Enfield	86 x 108	Not made	3.38 x 4.25	18.4
Alldays	86 x 108		3.38 x 4.25	18.4
B. S. A.	75 x 114	No change	2.95 x 4.49	13.9
Rover	75 x 130	No change	2.95 x 5.12	13.9
Belsize	94 x 121		3.70 x 4.76	22.0
Argyll	72 x 100	72 x 120	2.83 x 4.72	12.9
Humber	78 x 110	75 x 130	2.95 x 5.12	13.9
Sirron	80 x 110	80 x 120	3.15 x 4.72	15.9
Swift	68 x 110	75 x 110	2.95 x 5.12	13.9
Bentall	100 x 95	No change	3.94 x 3.74	24.8
Star	80 x 120	No change	3.15 x 4.72	15.9
Chambers	86 x 101	No change	3.38 x 3.98	18.4
Rothwell	80 x 127	No change	3.15 x 5.00	15.9
Rothwell	101 x 127	No change	3.98 x 5.00	25.5
Standard	79 x 120	No change	3.11 x 4.72	15.6
Alldays	85 x 108		3.35 x 4.25	18.0
Vulcan	90 x 120	Not made		
Vulcan	— —	80 x 150	3.15 x 5.90	15.9
Wolseley	79 x 120	Not made		
Star	90 x 120	Not made		
Star	— —	80 x 150	3.15 x 5.90	15.9
Hillman	89 x 114	89 x 110	3.50 x 4.33	19.6
Turner	75 x 120	Not made		
Turner	— —	69 x 110	2.71 x 4.33	11.9
Enfield	86 x 108	No change	3.38 x 4.25	18.4
Bell	90 x 120	No change	3.54 x 4.72	20.0
Straker	87 x 120	No change	3.42 x 4.37	18.8
Austin	80 x 115	No change	3.50 x 4.52	19.6
Calthorpe	80 x 150	No change	3.15 x 5.90	15.9
Enfield	100 x 115	100 x 130	3.94 x 5.12	24.8
Clement	85 x 120	95 x 120	3.74 x 4.72	22.5
Deasy	75 x 110	75 x 114	2.95 x 4.49	14.0
Swift	85 x 120	90 x 120	3.54 x 4.72	20.0
Humber	90 x 120	No change	3.54 x 4.72	20.0
Crossley	79 x 120	No change	3.11 x 4.72	15.6
Arrol-Johnston	80 x 140	No change	3.15 x 5.51	15.9
Sirron	80 x 127	No change	3.15 x 5.00	15.9
Sunbeam	80 x 150	No change	3.15 x 5.90	15.9
Alldays	101 x 130		3.98 x 5.12	25.3
Star	— —	90 x 150	3.54 x 5.90	20.0
Clement Talbot	80 x 120	No change	3.15 x 4.72	15.9
Dodson	80 x 120	No change	3.15 x 4.72	15.9
Iris	80 x 114	No change	3.15 x 4.49	15.9
Thames	80 x 135	Not made		
Adams	88 x 120	No change	3.46 x 4.72	19.2
Albion	79 x 127	No change	3.11 x 5.00	15.6
Argyll	80 x 120	No change	3.15 x 4.72	15.9
Baguley	90 x 130	No change	3.54 x 5.12	20.0
Napier	82 x 127	No change	3.23 x 5.00	16.7
Singer	80 x 130	78 x 125	3.07 x 4.92	15.1
Armstrong	80 x 135	No change	3.15 x 5.31	15.9
Deasy	80 x 130	No change	3.15 x 5.12	15.9
Dennis	90 x 110	Not made		
Dennis	— —	80 x 130	3.15 x 5.12	15.9
Rover	90 x 130	No change	3.54 x 5.12	20.0
Daimler	80 x 130	No change	3.15 x 5.12	15.9
Wolseley	90 x 120	No change	3.54 x 4.72	20.0
Calthorpe	90 x 150	No change	3.15 x 5.90	15.9

Name	1912 Bore and stroke	1913 Bore and stroke	Bore and stroke in inches	R.A.C. h.p.
Bell	101 x 140	No change	3.98 x 5.51	25.3
Rothwell	101 x 127	Not made		
Dennis	90 x 130	No change	3.54 x 5.12	20.0
Aberdonia	89 x 127	No change	3.50 x 5.00	19.6
Argyll	90 x 140	Not made		
Clement	102 x 111	Not made		
Crowdy	89 x 120	Not made		
Daimler	90 x 130	No change	3.54 x 5.12	20.0
Maudslay	90 x 130	No change	3.54 x 5.12	20.0
Singer	90 x 130	No change	3.54 x 5.12	20.0
Thornycroft	101 x 114	No change	3.98 x 4.48	25.1
Armstrong	85 x 135	No change	3.35 x 5.31	18.0
Vauxhall	90 x 120	No change	3.54 x 4.72	20.0
Humber	105 x 130	105 x 140	4.13 x 5.51	22.0
Deasy	90 x 130	No change	3.54 x 5.12	20.0
Crossley	101 x 140	No change	3.97 x 5.51	25.3
Crowdy	110 x 120	Not made		
Dennis	100 x130	No change	3.94 x 5.12	24.8
Sunbeam	90 x 160	No change	3.54 x 6.30	20.0
Armstrong	95 x 120	Not made		
Bell	115 x 150	117 x 150	4.60 x 5.90	34.0
Austin	110 x 127	No change	4.33 x 5.00	30.0
Hillman	127 x 127	No change	5.00 x 5.00	40.0
Wolseley	101 x 130	No change	3.98 x 5.12	25.4
Vauxhall	— —	95 x 140	3.74 x 5.51	22.5
Armstrong	100 x 120	No change	3.94 x 4.72	24.8
Clement	107 x 130	No change	4.21 x 5.12	28.5
Clement Talbot	101 x 140	No change	3.98 x 5.51	25.3
Daimler	101 x 130	101 x 140	3.98 x 5.51	25.3
Lanchester	101 x 101	No change	3.98 x 3.98	25.3
Crowdy	127 x 140	No change	5.00 x 5.51	40.0
Argyll	101 x 130	No change	3.98 x 5.12	25.3
Iris	108 x 133	No change	4.25 x 5.24	28.9
Thornycroft	114 x 127	Not made		
Dodson	100 x 140	No change	3.93 x 5.51	24.8
Austin	120 x 127	Not made		
Wolseley	120 x 130	Not made		
Daimler	124 x 130	No change	4.88 x 5.12	38.1
New Engine	114 x 114	No change	4.49 x 4.49	32.3
Iris	127 x 133	No change	5.00 x 5.24	40.0
New Engine	127 x 114	No change	5.00 x 4.49	40.0

SIX-CYLINDER CARS

Name of car	1912 Bore and stroke	1913 Bore and stroke	Bore and stroke in inches	R.A.C. rating
Vulcan	90 x 120	No change	3.54 x 4.72	29.4
Belsize	94 x 121	Not fixed		
Star	80 x 120	No change	3.15 x 4.72	23.8
Standard	79 x 120	Not made		
Arrol-Johnston	80 x 120	No change	3.15 x 4.72	23.9
Adams	88 x 110	Not made		
Daimler	80 x 130	90 x 130	3.45 x 5.12	30.4
Standard	89 x 108	Not made		
Clement Talbot	80 x 120	No change	3.15 x 4.72	23.8
Sunbeam	90 x 160	90 x 130	3.54 x 5.11	30.4
Napier	82 x 127	No change	3.23 x 5.00	25.3
Maudslay	90 x 130	No change	3.54 x 5.12	30.5
Crowdy	89 x 120	Not made		
Sheffield-Simplex	89 x 127	No change	3.50 x 5.00	29.4
Sheffield-Simplex	89 x 127	No change	3.50 x 5.00	29.4
Vauxhall	90 x 120	95 x 120	3.74 x 4.72	30.1
Wolseley	90 x 130	No change	3.54 x 5.12	30.4
Austin	110 x 127	No change	4.33 x 5.00	45.9
Deasy	90 x 130	No change	3.54 x 5.12	30.2
Daimler	101 x 130	101 x 140	3.97 x 5.51	38.2
Sheffield-Simplex	114 x 114	No change	4.49 x 4.49	48.6
Lanchester	101 x 101	No change	3.97 x 3.97	38.4
Armstrong	90 x 130	90 x 150	3.54 x 5.90	30.
Napier	102 x 127	No change	4.01 x 5.00	38.4
Rolls Royce	114 x 120	No change	4.49 x 4.72	48.6
Napier	127 x 127	No change	5.00 x 5.00	59.9
Wolseley	114 x 146	No change	4.49 x 5.75	48.6

A study of the above tables is of interest because they show the English trend. They show that for 1913 the average horsepower for four-cylinder English cars is 19.8, while for 1912 it was the same; for six-cylinder cars the average for 1913 is 36.8, while for 1912 it was 34.74. 90 per cent of the changes made for the new season have been towards a higher horsepower, but this has been neutralized by the number of small cars newly brought out. The average horsepower of the American car for 1912 was about 34.3

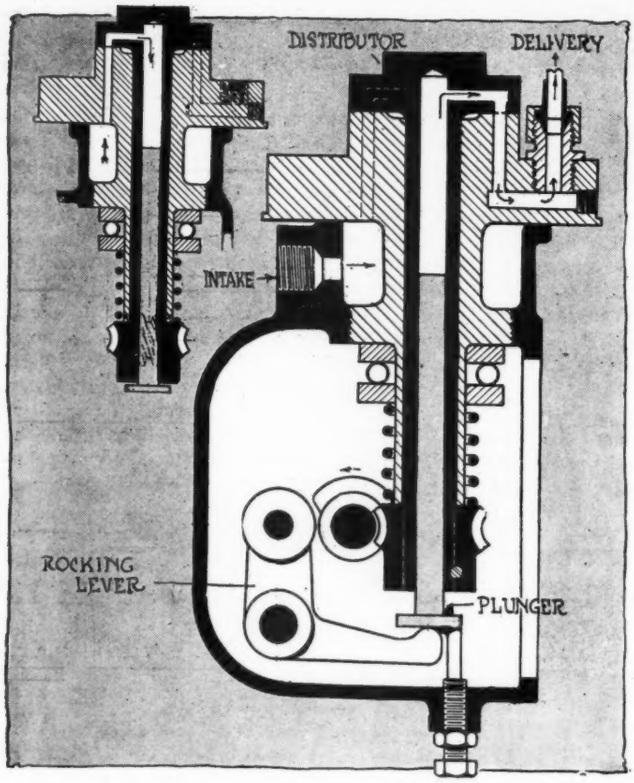


Fig. 3—Dodson oil pump on suction and discharge stroke

lar as the ordinary gilled-tube type, and Wolseley is the only conspicuous firm to adhere to it. The disposition of the radiator on Renault lines is found in connection with the Dodson, Deasy and Arrol-Johnston cars, and does not appear to be in any degree more popular than in previous years, nor is it likely to be in view of the tapering bonnets and scuttle dash boards which are the prevailing fashion. In all the best made cars of both small and high power the radiators are hinged to the side members in order to take up strains set up by deflection of the frame. Little or no change is apparent in the contour or shape as seen from the front, the only variation being in the radius of the curve adopted by the various makers.

The position with regard to lubrication is practically the same as previously. The entirely forced system to all bearings adopted by Crossley, Napier, Armstrong, Star, Vauxhall, Maudslay, Rolls-Royce and Sunbeam in past years is still in evidence, but the more popular system is still the forced to main bearings and trough systems to the connecting-rods. Practically no engine is now built which relies on splash alone. Makers generally are showing no disposition to alter their various systems which have previously been adopted, but are simply improving in detail. Rotary pumps are the most usual for circulating the oil, but where higher pressure is desired the forced pump comes in. A pressure of 20 to 30 pounds is usually found to be quite ample for ordinary work, which can easily be obtained by the rotary pump. For very high-speed work considerably greater pressure has been found necessary, and many of the cars which have done so well at Brooklands during the past season have had oil pressure of over 70 pounds per square inch.

One difficulty arises in connection with the entirely forced system, and that is the tendency to over-lubrication of the pistons by reason of the oil being forced through at too high a pressure. To prevent this baffle plates and scraper rings to the lower end of the piston are frequently adopted. Another method is to fit baffle plates, above which a chamber is formed to run along the whole length of the crankcase immediately beneath the cylinders. This provides an inter-communication between the various cylinders so that the piston suction of the ascending piston is compensated for by the descending one, and thus the oil spray from the crank-chamber is not drawn on to the cylinder walls to the same extent but merely the oil which has been splashed through the opening formed in the baffles for the connecting-rods.

Another point which militates against the freer adoption of the completely forced system is that of initial cost.

Except for racing purposes very little has been done in the way of insulating the oil reservoir from the crankcase for cooling purposes, nor does the ribbing of the outside surface of the sump receive any serious attention. For indicating the operation of the oil pump a pressure gauge is more usually fitted than an indicator.

An expensive but extremely efficient type of plunger pump is that used with the Dodson motors, Fig. 3.

This pump is comprised of a rotating barrel with a plunger that operates within it. In the upper end of the barrel is an opening which registers in turn with the intake and delivery port. As the plunger goes down the opening registers with the intake and the plunger sucks in the oil. On the up stroke of the plunger the opening registers with the delivery port and the plunger forces the oil through it. The reciprocating motion is given to the plunger by a cam operating on a rocking lever and the revolving motion is given to the barrel by a worm acting on the same shaft as the cam.

Another type of oil pump is shown in connection with the Vauxhall engine, Fig. 4.

A plunger pump is situated at the front end of the engine. The plunger of the pump, A, has a ball delivery valve B and an oil suction valve is placed at C; this latter ball valve is prevented from rising too high from its seat by the taper pin D. Oil enters the pump from the lower part of the sump E and passing the valve B on the downward stroke of the piston, flows through the drilled passage F in the first place into the air chamber G, which latter relieves the oil passages and pipes of any shock that might be due to the intermittent action of the pump. It will be noticed that the pump plunger has at its upper end a second piston H and the purpose of this piston is merely to prevent the passage of oil otherwise than through the drilled port F when the plunger is taking its downward stroke.

This method of construction, while it does away with the necessity for a stuffing box or long guide, enables the plunger to be withdrawn with facility and despatch. The pump is driven by a small crankpin having a ball bearing J. The oil on passing out of the air chamber G flows to the longitudinal pipe K, whence by way of short curved pipes, such as L, each of the main crankshaft bearings is fed from the underside through the bearing cap. Oil escapes from the bearing and drops into the sump E, whence it is filtered before again being drawn into the pump. A small chamber M is attached to the side of the crank-chamber; this chamber contains a float N of similar construction to those used in connection with the constant level of the gasoline supply. The float has a needle O which at all times registers the depth of oil in the sump. This needle is easily visible by lifting a flap of the bonnet and is not at all in an inaccessible position as are some glass gauges used for the same purpose. A pressure gauge on the dashboard shows the pressure in the lubrication circuit, and a tell-tale rises and falls at each stroke of the pump and indicates that the system is working and in order.

A very neat fitting is furnished in connection with the clearing of the oil sludge from the crankcase. The Vauxhall has used this particular fitting for a couple of seasons, but it deserves to be described here. A body piece is screwed into the bottom of the oil sump and this contains an ordinary mushroom valve pulled in a downward direction by a spring. Onto the underside of the body piece is screwed a cap and the length of the spindle of the valve is such that when the cap is screwed home the valve is forced from its seat. In this position any dirt or thick oil falls to the bottom of the cap, and is not affected by the pump suction. On removing the cap the valve is permitted

to seat itself and thus seal the opening in the sump bottom, while the contents of the cap may be thrown away and the cap replaced in its original position.

A small air pump is employed to deliver aid for lifting fuel from the gasoline tank. This pump has its trunk piston driven from the same pin which operates the oil pump. Both the suction and delivery valves are steel balls retained upon their respective seats by light helical springs. The piston, it will be noticed, does not reach the top of the pump cylinder, so that a high compression of the air would not be possible under any circumstances. There is, however, a small spring loaded safety valve at R which can be adjusted as to the pressure at which it shall blow off by the milled nut S. Air passes to the gasoline tank by way of the pipe T.

The Bosch magneto has become almost a standard feature with the British manufacturers. The fitting of the ordinary type or dual type is simply a matter of the price of the car, dual ignition being found in practically every car over $2,000. The dual system is most usually worked with one set of plugs. Two complete systems, magneto and coil, with separate distributers and plugs are only found on the very expensive cars, and generally in these cars the two systems are separate and independent. In view of the great reliability of the high-tension magneto the luxury of these two sets seems to be almost superfluous. Automatic advance is not taking on, while fixed ignition is only found with cheap cars. With regard to protection of magnetos the Bosch company has recently introduced a waterproof type which is entirely damp-proof in every possible way.

The number of firms who are discarding their own type of carbureter and taking up well-known models is becoming very prevalent. The Zenith, Claudel, Hobson, S. U., Solex and White & Poppe take a very large proportion of the trade. The Wolseley company has recently adopted the S. U. and the Sunbeam the Claudel-Hobson. It is quite clear that the manufacturers are leaving the question of carbureters in the hands of firms devoting themselves entirely to this component which is not only a saving of work done in the companies' factories, but a direct economy as well.

Self-starters are just beginning to receive serious attention. Wolseley is fitting as stock a self-starter on its six-cylinder models and at a charge of $100 to its four-cylinder models. The starter is a compressed-air type, Fig. 5. The air pump is driven by chain and sprocket provided with a clutch coupled to the end of the lay gearshaft. The compressor has two vertical cylinders with a pair of atmospheric outlet and twin delivery valves, and non-return outlet valve being placed in the air delivery pipe. The air is compressed into a steel reservoir, a gauge on the dash registering the pressure. The distributer has four cams driven from the end of the camshaft. The cams lift the distributing valves through tapered fingers which are withdrawn except when the distributer is moved into the starting position. Normally when the vehicle is running the pump is out of engagement, depending of course upon the pressure in the store tank. The shut-off valve is conveniently placed at the side of the chassis, which is closed when the vehicle is not in use and opened before starting. All the joints are most carefully made with the same material as is used for Diesel engines. The pipes are of steel with special connections used in submarine work. Spring loaded non-return injector valves are fitted in the exhaust valve caps of the cylinder. The distributer is so arranged that when not actually starting the engine no parts are in motion. The starting lever on the dashboard is so arranged that it throws the tappet levers into position between the starting cams and valve stems, this being combined with a motion which opens the air admission valve. Of course, the air compressor can be arranged to pump the tires, thus increasing the operator's comfort in more than one way.

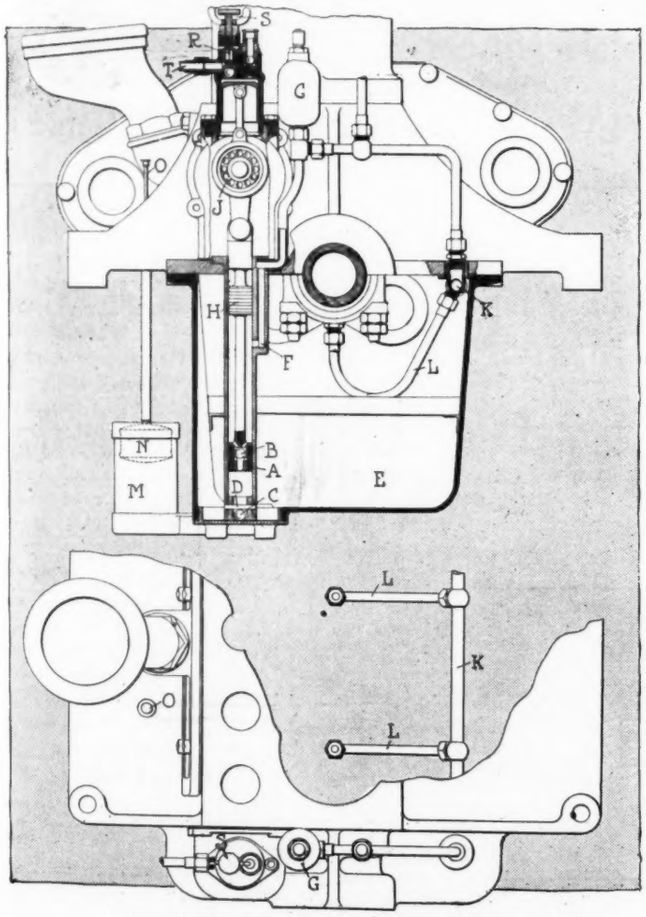


Fig. 4—Vauxhall motor oiling system

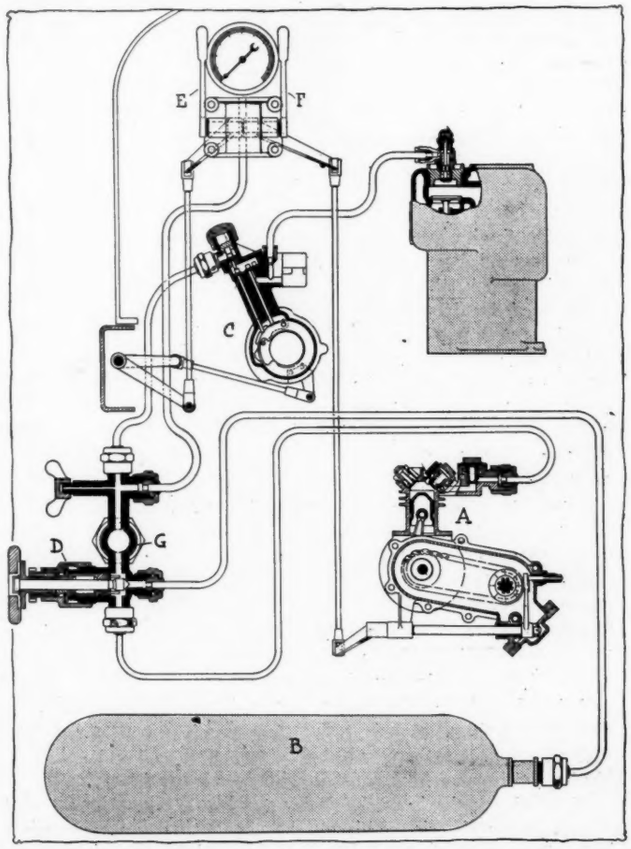


Fig. 5—Wolseley compressed air self-starter, one of the two self-starters in use on English cars

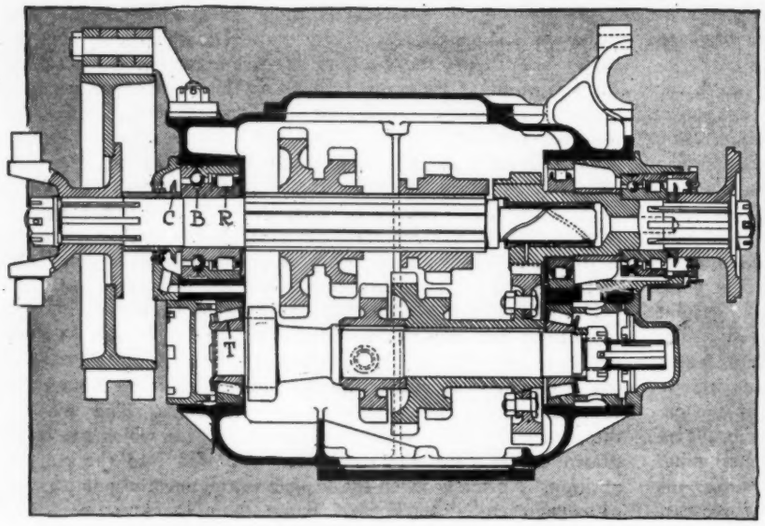


Fig. 6—Wolseley gearbox for 16-20-horsepower car

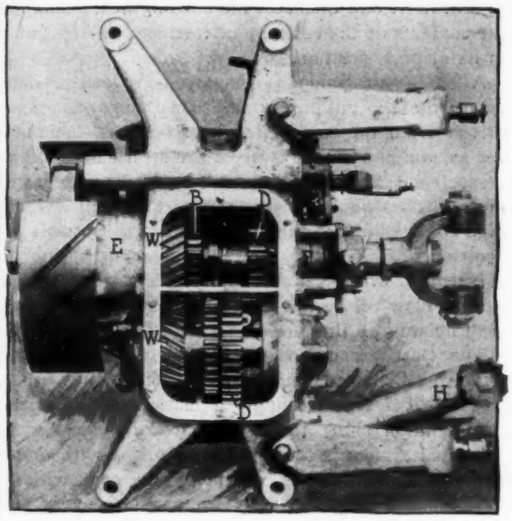


Fig. 7—Napier six-cylinder car gearbox

Wolseley is the second firm in this country to adopt the self-starter as stock equipment, the previous one being the Adams, also using compressed air. Now that a start has been made in fitting self-starters the further adoption will make more rapid progress. Many firms are looking closely into the proposition, and the most favorably received are compressed air and electric Acetylene starters as used in America are not looked upon with any favor.

Detachable wheels are making great headway, and the makers supplying these without extra charge have doubled for 1913. The detachable wire wheels of the Rudge-Whitworth or Riley type predominate, and a larger number of makers is using the pressed-metal wheel of the Sankey pattern, and this type is receiving considerably more favor than during the past season, one of the reasons being that it more nearly approaches the wooden wheel in apparance. It is a very much easier wheel to clean and has proved itself in practice to be as strong as the wire type. The chief advantage of the wire type is in connection with the saving effected in the wear of tires. This saving was demonstrated by the number of Daimler cars of heavy construction which have been used for hiring purposes. Fifty were fitted with wire and fifty with wooden wheels, and after a very extended period of time it was found that the total mileage of tires fitted over wire wheels was 172,731 and the total mileage of the tires fitted over wooden wheels was 102,524. The tire sizes were 935 by 135. The writer's own experience confirms this to some extent, as with the same car 33 per cent. extra mileage was got out of the tires when fitted to the wire wheels.

Where changes are being made in the number of speeds it is found that such change is from three to four. A notable change has been made by the Napier company with their 15-horsepower Model de Luxe, which has hitherto been fitted with only three speeds. For the future a four-speed gearbox can be supplied. Humber is adopting four speeds in its 68 by 130 and its 75 by 130. Standard, Dodson, Dennis, Calthorpe, Bell, 10-horsepower; Austin 12-horsepower, Swift and Sheffield-Simplex are all supplying four-speed gearboxes in place of last year's three-speed models. With these modifications the four-speed gearboxes are considerably in the majority. Short, compact gearboxes of the one-piece casting type notably give the best results, and the aim of every manufacturer is directed to this end. The multi-spline shaft is universally adopted, and the six splines are increasing in numbers, although not predominating. Spigot shafts are in many cases fitted with ball bearings.

Fig. 6 shows the latest Wolseley gearbox product for its 16-20 four-cylinder chassis. This gearbox is remarkable inasmuch as it is fitted with three different types of bearings, namely, the parallel roller R, Timken roller T and ball B. The gearbox

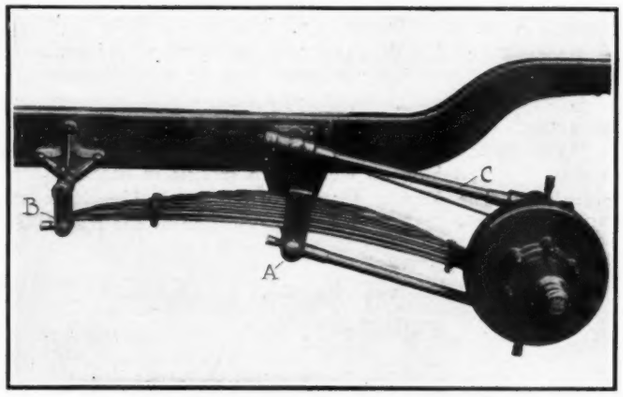


Fig. 7 A—Deasy Lanchester spring system

is arranged for four speeds, and there are six splines on the shaft carrying the sliding gears. There is no longitudinal division of the gearbox, and special means are taken for preventing the oil from escaping along the shaft, oil catchers C and felt pads being employed. The size of the brake drum fitted to the shaft is typical of the better-class British cars. Brake diameters and widths have increased to very substantial proportions. The large diameter of the gearbox shaft is worthy of notice.

In the gearbox of the six-cylinder Napier, Fig. 7, compactness is the cardinal characteristic, so as to make the shafts as short as possible for stiffness and for silence of gear changing. The box is aluminum suitably webbed. The countershaft is driven by helical-cut gears and the second speed sliding gear acts as top speed direct driving dog which meshes with internal cut teeth in the main shaft helical gear.

The gears are of large proportions, the mainshaft is specially interesting, runs on ball bearings, and at the rear end revolves in a large double row bearing within the casing projecting beyond the gearbox proper. The shaft is thus supported immediately under the brake drum and will properly withstand strains thrown upon it by application of the brake, which, again, is an entirely new type internally expanding, having all its mechanism inside the drum. The mainshaft has a large adjustable stuffing-box at either end so oil cannot escape on to the brake.

The front stuffing-box has its gland notched and a spring bolt locks in any position after adjustment.

The oil filler is conveniently arranged under the driver's footboard; it also acts as a level indicator as when filling the oil should be poured in so that it just appears in the orifice.

An interesting method of gearbox lubrication is shown in connection with a patent taken out by Wolseley, No. 20,228. Although this arrangement of lubrication is not standardized, it, however, foreshadows construction which may materialize as a commercial practice at a subsequent date.

Fig. 8 requires but little explanation. The gears revolve in troughs and in the bottom of the gearbox is a sump which contains a quantity of oil. This is circulated by means of a pump in a similar manner to the troughs provided for lubricating the connecting-rod ends. The principle is shown applied not only to sliding gearboxes, but also to worm drives, and for lubricating chains in connection with engine timing gears.

The chain-driven gearbox is making no headway in connection with pleasure cars, an objection to it being the extra weight. Maudslay introduced this type last year, but is not continuing it.

A recent patent taken out by Wolseley, Fig. 9, shows a combination chain-and-spur gearbox which indicates that considerable thought is being directed to the chain-driven gearbox. The chain box has been so successful with omnibuses that its adoption for pleasure cars is certain to be more conspicuous in the near future. With the Wolseley box the third gear is directed by dog clutches, the second speed is by silent chains and the first speed by gears. Reverse is partly through chains and partly through gears. The driving shaft is shown at A and the driven shaft at B, this being connected to the propeller shaft as usual. For the direct drive the dog clutches C are engaged. For the second speed the dog clutches D are engaged when the power passes through the chain wheels E (chain not shown) to the layshaft, reaching the driven shaft B through the chain on the chain wheels F. For the first speed the dogs D are disengaged and the gear sleeve G moved to the left. The power then passes through the gears H, and so to the gear sleeve G, and thence through the gear wheels J to the driven shaft. The gear sleeve G is mounted on bearings upon the layshaft so that the two can rotate independently. For the reverse gear the sleeve G is moved to the right, meshing the dogs K, while the gear wheel L engages the wheel J on the driven shaft B. The reverse is therefore through chain wheels E and gears J and L, the layshaft and sleeve then revolving in the same direction.

The underslinging of wheel springs is becoming more prevalent. Wolseley adopted this last year, and now Daimler is following with its 20-horsepower model. This practice of underslinging is but a return to a practice which was common 10 years ago. The chief advantages are that it enables the springs so to convey the torque of the axle casing when the drive is first taken up or the brakes are applied, and that the dithering which is common under these conditions to a large number of cars is prevented. The radius and torque rods minimize this feature, but there is no doubt that with a carefully designed underspringing the best results can be obtained without the additional fitting of torque and radius rods. The objection from the user's point of view is the fear of breakage from the spring clips, but of course it is quite a simple matter to provide a sufficient strength in these parts. Daimler is employing two spring clips placed diagonally instead of the more usual parallel system.

Springs are to be long, wide and with little camber so that when loaded they are practically flat, and the three-quarter elliptic is most favored. The dimensions with a well-designed car suitable for a covered body will have springs 48 inches long, 2.5 inches wide and composed of about six plates. Instead of shackle plates under the two parts of the spring shock-absorbers, or in reality spring shackle plates are usually provided.

The Lanchester system of springing adopted by Deasy, Fig. 7A, consisting of an inverted half elliptic leaf spring at each side in combination with parallel link motion. The spring is fixed to a bracket which is pivoted at A. Its front end is attached to the shackle B, while its rear end is housed in a slide attached to the ends of the back axle. At A is pivoted the radius rod, which is articulated to the back axle immediately below the spring pad. The radius rod forms the link which conveys the propulsive thrust of the driving wheel to the chassis, and, as will be seen by reference to Fig. 7A, the link is attached to the back axle end by means of a universal joint.

Torque rod C is likewise articulated to the back axle casing, lying parallel with the radius rod. The function of this torque rod is to prevent the tendency the engine has to try and rotate the axle casing against the resistance of the road wheel. The

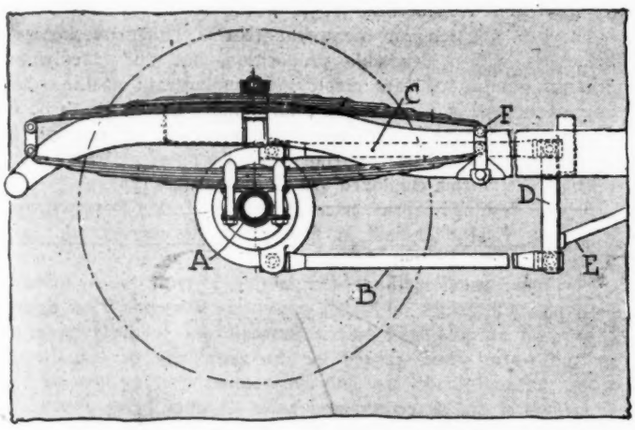


Fig. 7 B—The Austin featured rear spring system

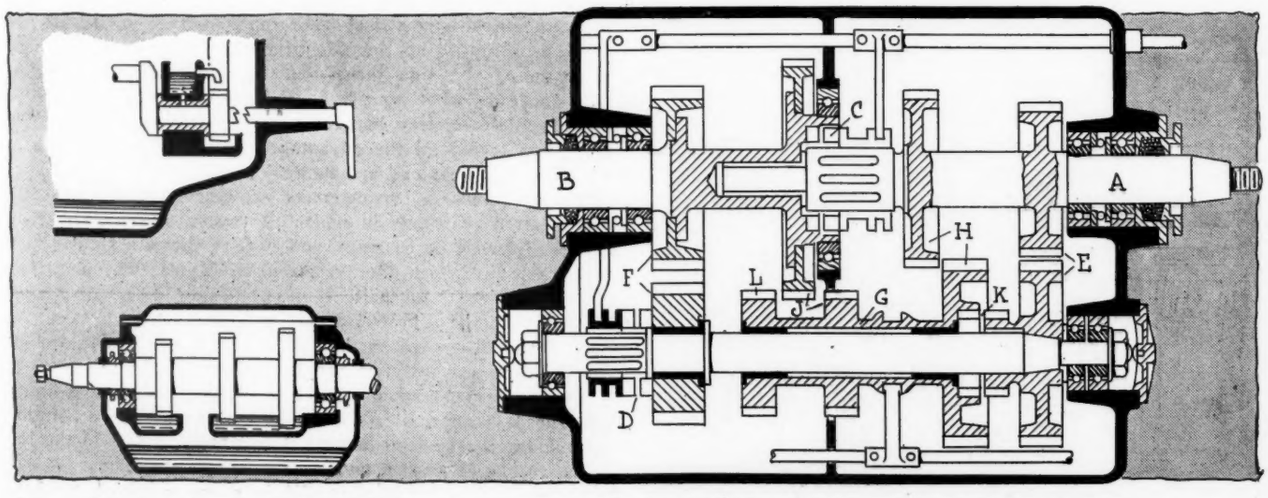


Fig. 8—Wolseley patent for gearbox oiling

Fig. 9—Wolseley combination gear and chain gearset

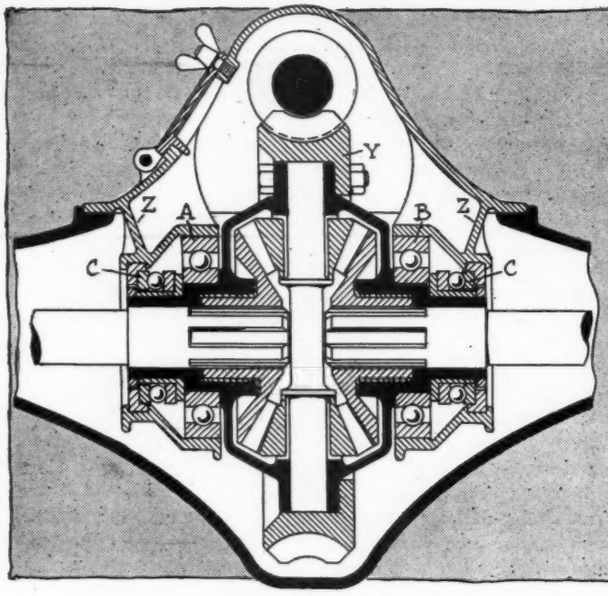


Fig. 10—Worm mounted midway between annular bearings

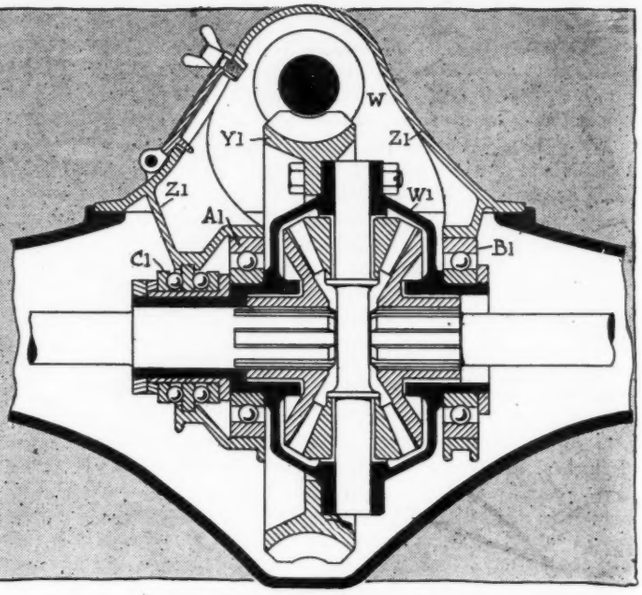


Fig. 11—Worm mounted out of center between bearings

rod effectively prevents this action, and in order to avoid any possibility of shock or jar being transmitted through it, it is provided at its rear end with a telescopic joint, in which it works against the action of spring buffers. All the moving parts throughout this mechanism are fitted with efficient means for its lubrication and is thoroughly waterproof. The suspension on each side of the axle is quite independent; the illustration shows the detachable wheel removed for the sake of clearance.

Another spring suspension off the ordinary lines is the Austin, Fig. 7B. In this arrangement to take the live axle torque and also the strains of driving and braking effect, the axle casing A is connected by parallel rods B and C to a rigid hanger D which is connected by struts E to the frame. By means of the parallel link system B C the axle is prevented from twisting as it moves in relation to the frame when so permitted by the springs. As will be gathered, the ends of the axle are not restrained by means of the rods C from moving backward and forward, As it is desirable to check such movement, the front ends of the springs at F are fixed to the frame, so that this movement of the axle is resiliently resisted.

The worm drives do not appear to be making any marked progress. Taking 131 models in 1912, forty-eight were fitted with the worm drive, equal approximately to 36 per cent. of the total. Compared with 128 models in 1913 forty-seven are fitted with worm drives, or approximately 37 per cent. This year Sunbeam discarded the worm drive, and for 1913 Maudslay is taking a like action, returning to the bevel drive. In each case there are local reasons.

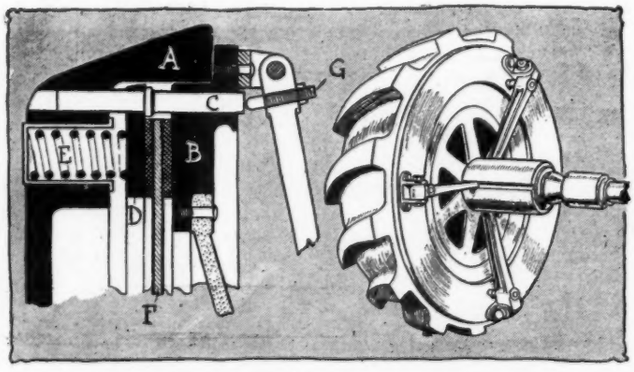


Fig. 14—Deasy clutch in section and perspective

Daimler, Argyll, Armstrong-Whitworth, Deasy, Lanchester, Vulcan, Dennis and Thornycroft continue worm drive. Several makers, however, appear to be undecided, and supply either bevel or worm at the purchaser's option. This does not appear to be a very satisfactory method of dealing with the proposition, and it must entail considerably larger works costs.

The best position for the worm, that is, either overhead or below, is still a debatable proposition, but undoubtedly the greatest number of cars employ the underneath position, and only about 25 per cent. of the total number are found to be of the overhead type. The relative merits of the concave or parallel worm are still far from settlement, and at least 50 per cent. of the worms employed are of the parallel type.

A well-designed worm drive is that made by David Brown & Sons, of Huddersfield, a firm supplying worms and back axles for many British cars.

The more usual method of mounting a worm wheel midway between its bearings, although presenting a symmetrical design throws an unequal load on the journals due to the side thrust on the worm wheel caused by the angularity of the thread. These unequal loads can only be counteracted by placing the worm wheel out of center, and exact distance being dependent upon the angle of inclination of the worm thread and the pressure angle of the teeth.

Where the worm wheel is so placed out of center, the design presents an unsymmetrical appearance, but if a double ball thrust is arranged on the side of the journal remote from the direction of the side thrust on the wheel, then the correct position of the wheel to give equal loads on the bearings will be approximately midway between the two extreme points of the unit, thus giving all the advantages of increased efficiency together with a neat and symmetrical appearance.

Fig. 10 shows an arrangement of gearing as applied to a worm-driven rear axle in which the worm wheel Y is placed midway between its bearings, and Fig. 11 shows a similar form of gearing in which the worm wheel Y1 is unsymmetrically placed between its journals.

In Fig. 10 the differential gearing is mounted on two bearings, A and B, carried on the case Z and on either side of these journals are mounted two thrust washers C. In this arrangement of gearing, assuming the power to be transmitted on the low speed is approximately 30 horsepower at 300 revolutions per minute, the load on bearing A is 7,530 pounds and the load on bearing B is 4,350 pounds.

Referring now to Fig. 11, W is a worm which transmits motion to the worm wheel Y1 mounted on the differential cas-

ing W1 which contains the usual differential gear and is set out of center. The differential gearing is mounted on two journal bearings A1 and B1 carried by the case Z1. In this arrangement of gearing an equal load is obtained on each bearing.

The Brown improvement consists in applying a double-acting thrust bearing. C1 located on one side of the worm or spiral gear wheel whereby a symmetrical design and increased efficiency of the gearing is obtained, the thrust in both directions being taken up by said bearings.

The worm arrangement of the Thornycroft car is typical of many others. Fig. 12 shows a longitudinal section through the axle and Fig. 13 a transverse section. The worm is of the type having a concave face and it is not solid upon its shaft, but is driven on to four splines on solid keys formed upon the shaft. Presumably this is done to facilitate, or in any case to cheapen, the replacement of the worm should such replacement become necessary. A double ball thrust bearing is fixed on the back end of the axle. The dome-shaped cover on the top of the casing, which can be readily removed, permits great accessibility to the internal parts, and it will be seen that the driving axles have fluted ends that engage with the bevel pinions of the differential gear; thus these axles may be pulled out to permit withdrawal of the worm wheel, differential casing, bearings, etc.

The leather-faced cone clutch is still the most popular type. In 1912 58 per cent. of the British cars were fitted with this type, while the proportion for 1913 works out at 59 per cent. The multiple-disk clutch takes second place, and the figures for 1912 are 25 per cent and for 1913 27 per cent. The figures for the single type for 1912 are 13 per cent. and for 1913 11 per cent., the balance being accounted for by other types, such as the metal expanding.

The Deasy clutch, Fig. 14, is completely inclosed within the flywheel. A diagrammatic section of part of it indicates the manner in which the clutch is arranged. A is the rim of the flywheel, to which is screwed a disk B carrying a dished aluminum center, spoked as shown. Supported in these two members are three sliding pins C, the shoulders of which abut against a flat ring D, which is in turn supported by the pins C, and is pressed into engagement by six spiral springs arranged circumferentially, one of which is shown at E. These springs are carried in the web of the flywheel in brass thimbles.

Between the ring D and the inner edge of the rim B is interposed a disk F carried in the aluminum center, within which it is free to rotate. Mounted on B and D are rings of asbestos fabric. The effect of the springs E is to grip the center plate F between the fabric-lined surfaces of D and B, and as the friction thereby produced is very large, owing to the nature of surfaces, only comparatively light springs are necessary.

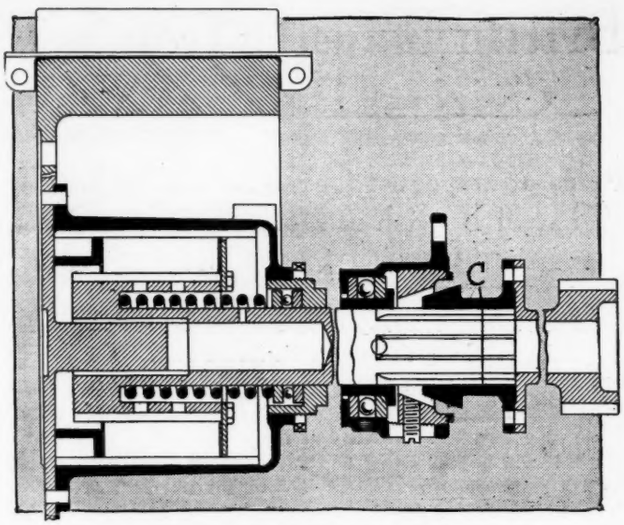


Fig. 15—Section through Thornycroft plate clutch

A thrust ring carried concentrically with the clutchshaft and actuated by the clutch pedal operates three rocking levers pivoted to the rim of the flywheel. These levers carry thrust pins G which press against the outside ends of the pins C, and pressure upon the clutch pedal therefore throws D clear of F and allows the clutch members to run free of one another. A small additional spring is introduced on the clutch shaft to allow the disk F, when the pedal is depressed, to run clear of the surface of B.

In the Thornycroft plate clutch, Fig. 15, the piece which transmits the drive from the plates is one piece with the shaft and this shaft is drilled from its front end so as to take the supporting tail shaft as well as for the sake of lightness; this same shaft is fluted at the rearward end into the coupling C. The whole constitutes perhaps a somewhat expensive piece, a point worthy of consideration if renewals are likely to be necessary. The ball thrust bearing that comes into play on the withdrawal of the clutch is a heavy one and certainly, having in view the comparatively light clutch spring, would not appear to be overloaded.

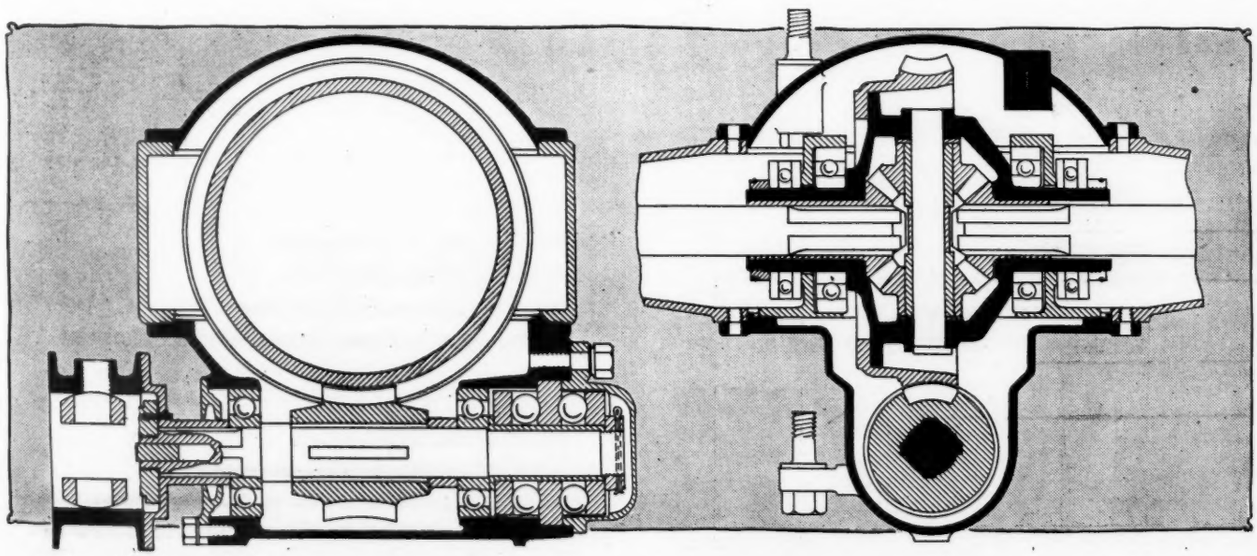


Fig. 12—Longitudinal section through Thornycroft rear axle adapted for worm drive

Fig. 13—Transverse section through rear axle of the Thornycroft car for worm drive

British Industry from Critical Point of View

Price of Imported Cars Has Fallen While That of English Automobiles Has Been Raised, Cutting Out Cheap Grades

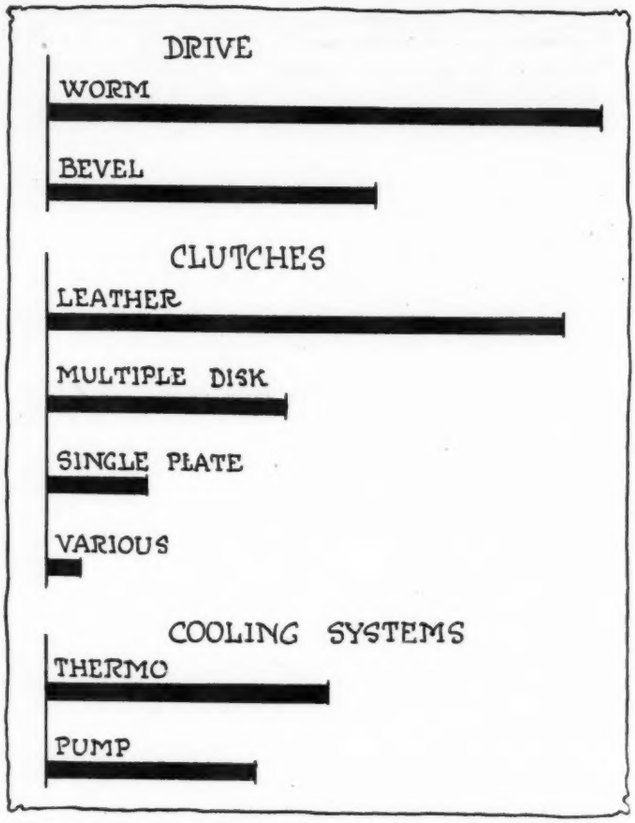
Practice of Making Many Models in Small Factories Eliminates Competition on a Strict Basis of Price

AFTER reviewing the mechanical features of the exhibits which are being installed at the Olympia Hall on November 8, it will be interesting to consider the present state of the British motor industry. Great Britain has no tariff or import duty, and therefore the world's productions can be offered for sale on an equality with the home made constructions. The pros and cons of the fiscal policy of the British Government are not within the scope of this review. The question of tariff reform must be left to the political arena, and the only connection free imports have with the general aspects of the automobile industry is in regard to the means which the British manufacturer has, or may adopt, to keep out foreign competition.

Upon reflection it appears somewhat strange that the British manufacturer has only been roused, or perhaps to be more correct, the British public, in this direction, by the comparatively recent importation of cheap American cars. For years past, ever since the automobile industry became a live one, the imports of cars, chassis and parts from the Continent of Europe has each year assumed large and increasing proportions, in fact, as the popularity and usefulness of the motor has developed, so have the imports increased.

There is good excuse for the purchase of the cheap high-powered American car by the British user, for the reason that hitherto neither the Continental, nor the British makers have provided that type of vehicle, that is a powerful four-cylinder car, light in weight, and not exceeding £200 in price.

While constructors on this side have been making expensive cars for the wealthy buyer, the American constructors have been working out the proposition of supplying a lower grade article, cheap in first cost, and cheap to renew, which is within the range of a man of moderate means, and there is distinct evidence that the importation is having an effect on the British productions with those makers who have attempted in a feeble manner to produce a low-priced car. Importation, however, is having an effect which is proving beneficial to the manufacturer of higher class cars here. The American car has been the means of educating a large number of people in the use of motors who have since learned to enjoy the pleasures which the ownership of an automobile brings with it. Once a motorist always a motorist is a truism, and many who have commenced their motoring experience with a cheap car are now owners of more expensive types of vehicles.



Graph showing ratios of constructive features as shown on British automobiles for 1913

It will be of interest to give some particulars of the importation of cars into this country, and the accompanying table gives the imports from 1908 to 1911.

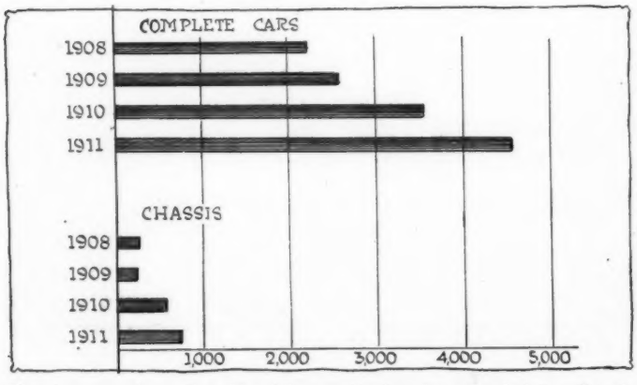
For the 9 months ending September 30, 1912, the value of imports was as follows:

Cars, 6218, value	£1,478,397
Chassis, 6906, "	1,490,726
Parts, "	2,483,562
Total	£5,452,685

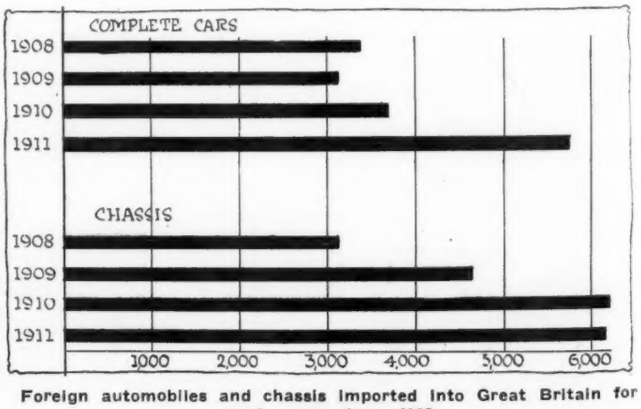
In 1911 the corresponding figures were:

Cars, 4927, value	£1,286,351
Chassis, 5198, "	1,353,568
Parts, "	1,925,274
Total	£4,565,193

The value of imports from the United States has been ap-



Showing number of automobiles and chassis exported by Great Britain during the last 4 years



Foreign automobiles and chassis imported into Great Britain for each year since 1908

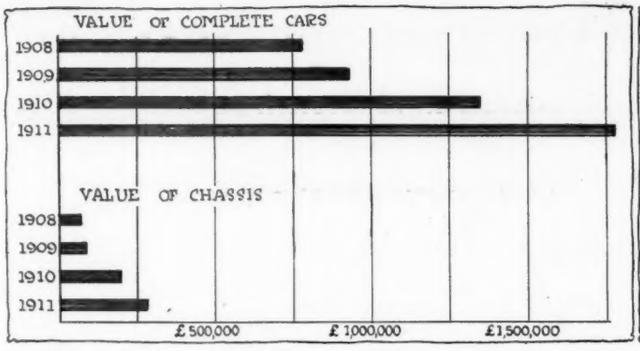
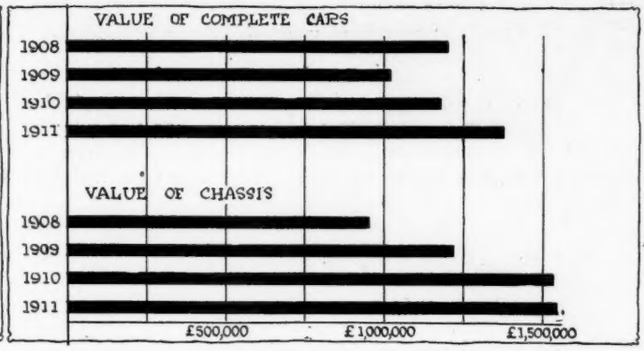


Diagram illustrating total values of British automobile exports for the last 4 years



Respective values of Great Britain's automobile and chassis imports since 1908

proximately as follows: Complete cars, chassis and parts, 1910, £495,383; 1911, £676,053; and for the first 9 months of 1912 £631,318.

From these figures it will be seen that the figures for 1912 will considerably exceed the figures of 1911, for on September 30 the figures showed an increase of £135,935 over the figures for the 12 months of 1911. From the figures relating to the American productions one finds that 4,001 vehicles were imported from the United States in 1911, and 2,340 for the first 5 months of this year, while there is evidence that the numbers imported are increasing at a rapid rate, so much so, that very shortly the United States will be the greatest exporter of complete cars and chassis into this country, both in numbers and total value.

While the imports rise it is encouraging to see the exports also rise, the figures relating to which are set out in the accompanying table.

For the 9 months ending September 30, 1912, the total exports amounted to £2,532,573 as against £2,126,602 for the year 1911.

In view of the many records achieved by British cars it is obvious that the importations are not due to their inferior quality. Looking at the average prices during the past years of the imports and exports, it will be seen that the price of the imported cars has steadily decreased, while the average price of the British-built exports has increased. In 1908, the average price of cars imported was £363, falling to £253 in 1911, whereas the average price of exported cars has risen from £361 in 1908 to £397 in 1911. It therefore appears evident that the manufacturers of Great Britain intend to increase the price of their constructions, and that they do not trouble themselves to set about the production of cheap automobiles. What is the reason of this attitude, and why is Great Britain content to allow this large proportion of its purchases to go to the foreigner, and, further, what is the British manufacturer doing to meet the situation? First, the manufacturer of repute has no inducement to do otherwise than he is doing at the present time. With the capital he has at his disposal he is getting all the trade he is able to cope with, and therefore has no desire to reduce either quality or price. As regards output and profit he is quite content, and every year one sees the gradual increase of plant and buildings, paid for mostly out of profit.

Great Britain Can Build Cheaply

Some 2 years ago the writer went most carefully into the cost of manufacturing automobiles in Great Britain, with the head of one of the largest automobile factories in the United States, and the conclusion arrived at after a most careful and elaborate study in connection with the conditions of labor, cost of materials both in England and America, and also in Europe, was that in no country in the world could automobiles be built more cheaply than in Great Britain.

However, the British constructor has little initiative. He wants his market sure at the outset, and is not running any risk of setting out to make goods of which there is an element of doubt as regards their disposal. In other words, he has no confidence in his selling organization, and he therefore runs his business on safe and sure lines.

There is abundant evidence that cheap cars for the multitude can be built here at competitive prices, and such cars would, now that the motoring fever has not only developed to the fullest extent, but is rapidly extending to our Colonies, sell in large numbers, yet no financier or financiers are yet forthcoming to provide the necessary capital.

Another factor in connection with the British motor industry which does not tend toward cheap production is the policy adopted by the majority of manufacturers in making a large range of models, and trying to satisfy every inquiry that comes along. Even the smallest firms are constructors of three, and, in many cases, four models.

It does not appear likely that any of the well-established firms will in any way modify their existing policy in producing only expensive models, in fact, it would be prejudicial to their best interests to do so. As an example, some 2 years ago, one of the largest firms made a substantial reduction in its prices. Did it sell more cars? On the contrary, the public at once said that the firm had reduced quality, and the sales actually fell, only to be recovered by a substantial increase in the following year.

Foreign Vehicles, Chassis and Parts Imported to Great Britain

	1908	1909	1910	1911
Complete cars	3,830	3,666	4,516	6,778
Re-exports	434	550	822	1,047
	3,396	3,116	3,694	5,731
Chassis	3,370	4,855	6,553	6,672
Re-exports	236	224	332	494
	3,134	4,631	6,221	6,178
Value of complete cars	£1,389,552	£1,223,053	£1,439,962	£1,717,983
Value of re-exports	161,561	177,064	234,458	308,569
	£1,227,991	£1,045,989	£1,205,504	£1,409,414
Value of chassis	£1,063,077	£1,321,596	£1,671,593	£1,723,889
Value of re-exports	88,446	78,271	104,842	152,735
	£974,631	£1,243,325	£1,566,751	£1,571,154
Total net value	£2,202,622	£2,289,314	£2,772,255	£2,980,568
Average price per car	£363	£333	£319	£253
Average price per chassis	£315	£272	£255	£258
Value of parts less re-exports	£1,550,518	£1,633,467	£1,840,401	£2,336,182
Total value of all imports	£3,753,140	£3,922,781	£4,612,656	£5,316,750

British Vehicles, Chassis and Parts Exported to Foreign Countries

	1908	1909	1910	1911
Complete cars	2,216	2,580	3,555	4,539
Chassis	225	221	564	733
Value of complete cars	£800,636	£952,431	£1,376,886	£1,805,025
Value of chassis	£75,984	£85,356	£213,536	£295,289
Total value cars and chassis	£876,620	£1,037,787	£1,590,422	£2,100,314
Average price per car	£361	£369	£387	£397
Average price per chassis	£337	£386	£378	£403
Value of parts	£381,939	£525,818	£1,015,105	£1,085,403
Value of all exports	£1,258,558	£1,563,605	£2,605,527	£3,185,717

Automobiles, like other commodities, are not sold solely on their merits. In fact, other influences in many cases count for more than merit.

The American importation has already had this effect on the British trade. It has entirely killed the one and two-cylinder cars. No less than fourteen models of the one and two-cylinder type have been discarded. The Rover Company has discontinued four models of the one and two-cylinder type, and will construct for 1913 only two four-cylinder models, namely 12 horsepower, 75 by 130 millimeters at a chassis price of £275 and a larger 20-horsepower model, 90 by 130 millimeters, the chassis of which is listed at £375. Last season this firm listed a one-cylinder car complete at £135.

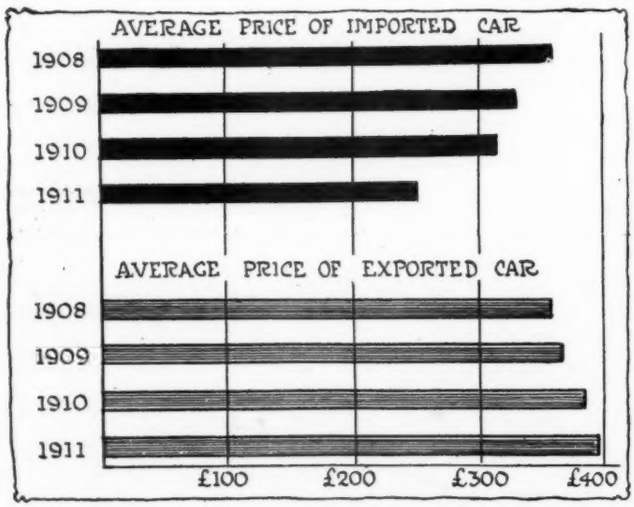
The Swift Motor Company is also discarding its one and two-cylinder types, and will in future only construct four-cylinder models. The smallest size is a 10-horsepower, 65 by 100 millimeters, chassis listed at £175, or with body, £195. This latter model is an attempt to compete with the American cars. In comparison, this British car has roughly only half the horsepower and is considerably more expensive than some of the importations.

The decease of the one-cylinder car will be regretted by none, and it is amazing that it has been permitted to exist for so long a time.

A new type of car, termed the cycle car, is being introduced by more than one firm. The Humber and Singer, among others, are in the market with a light four-cylinder machine selling for about £125. This class of vehicle is very light, built on cycle lines, and has been allotted a special class by the R.A.C., weight being the basis of the class. The cycle car, as termed by the R.A.C., is a car, the weight of which does not exceed 6 hundredweight, and such cars are not permitted to compete with so-called motor cars in any contest under R.A.C. rules. These vehicles are designed to run at a cost not exceeding 1 penny per mile for tires and gasoline. It is doubtful if this type of car will in any way meet the foreign competition, but it will certainly replace in a number of instances the cycle and side car, the use of which has, during the past 12 months, reached enormous proportions. With this light type of car a two-cylinder engine is usually employed.

Hoosier Trade Decides on Show

INDIANAPOLIS, IND., Nov. 11—The annual motor car show of the Indianapolis Automobile Trade Association will be held March 24-29 and probably will be held at the Coliseum at the state fair grounds, north of Indianapolis. At an election held recently the club elected a new board of directors.



Average price per car of Great Britain's automobile imports and exports

Manx Race for Next Year

Announcement of British Classic for 1913 At Olympia Show Meets Hearty Approval of the Automobile Industry

Attendance at Exhibition Sets New Mark and Affair Is Called Best Body Show World Has Seen

LONDON, Nov. 12—*Special Cable*—Announcement was made at the banquet held on the evening before the Olympia show opened that the Royal Automobile Club had decided to organize a race to be held on the Isle of Man in 1913.

The announcement was received with the utmost enthusiasm. The object of the race is to give the British manufacturer an opportunity to show that he can produce a car at moderate price of such quality that it can stand the severe test of a road race lasting 2 days.

There is a distinct spirit of optimism prevalent throughout the whole industry. The show attendance is a record so far. No less than 34,672 persons visited the show on Saturday last, which is 30 per cent. above last year's figures. Many makers have sold their output before the doors were opened.

There is little that is actually novel in chassis construction but improvements in details abound. The attractions chiefly center around the superb examples of carriage work. All the most renowned carriage builders of Europe are represented. The automobile body construction shows more advance than any other section of the industry and the present exhibition will take rank internationally as the finest exhibition of carriage building ever held. Large enclosed cars predominate and the ordinary landaulet is almost entirely superseded by the limousine-landaulet. Great inerest is being shown in self-starters. The feeling generally is in favor of the electric combined with a lighting outfit. Several experimental plants of this type are on view but no makers are yet adopting any as a standard equipment.

Detroit Dealers to Draw for Show

DETROIT, MICH., Nov. 11—A meeting of the entire membership of the Detroit Automobile Dealers' Association will be held on November 23 at which the first drawing for the annual show at the Wayne Gardens will take place. All applications for space must be in hand by November 20 to participate in this drawing, which will be conducted by Walter Wilmot, who will again be in charge of the affair.

Many applications have already been received and Mr. Wilmot predicts the largest show yet held in this city and the largest possible with the space and facilities available. This year's show will be on the National show circuit, hence greater importance will attach to it than to similar events held here in the past. Many of the Madison Square Garden exhibits will be brought here before being sent to Chicago for the annual gathering at the Coliseum.

At the meeting various details as to allotment will be decided. This first drawing will be for the members of the association. Space allotment for non-members will take place November 25.

Dealers to Finance Toledo Show

TOLEDO, O., Nov. 9—The members of the Automobile Dealers' Association held a meeting early this week at the Commerce Club and voted to form an exhibition company to float an automobile show in January. Incorporation papers have been sent to the secretary of state at Columbus. Automobile dealers and accessory men only will be permitted to subscribe for shares of stock in the company, the capital of which will be $10,000.

3-Liter Race the Feature

Grand Prix May Be Abandoned for Lack of Interest and Chance Exists for Small Cars to Compete in It

Savannah Again Seeks Vanderbilt Cup and Grand Prize if Entry List Is Guaranteed to Local Club

PARIS, Nov. 6—At the moment the entry lists for the French Grand Prix were closed with a total of sixteen out of the minimum of forty cars required—thus probably entailing the abandonment of the race—the rules were made public for the Coupe de l'Auto, or 3-liter race to be managed by the newspaper *L'Auto*. In all probability this will be the only race of the year, for *L'Auto* is opposed to allowing the big cars to join in with the 3-liters, as was done at Dieppe this year, and the national club cannot hold its race independently with only sixteen cars. There is a possibility that the club, having failed to get the required number of entries for its own event, may ask to be allowed to join *L'Auto* in the organization of the 3-liter event, thus giving an official character if not adding to the importance of this race.

It is now certain that the 3-liter race to be held on Sunday, June 29, over a course yet to be selected, will be the most important European speed contest of the 1913 season. Races have been run under these rules in 1911 and 1912, and next season will see their last application, the organizers being of the opinion that full advantage will have been got out of them after 3 successive years' experience. Though the same in principle, there are a number of important detail changes in the regulations. Feeding the cylinders by any mixture at more than atmospheric pressure is forbidden.

Last year Hispano-Suiza built a set of cars with a couple of additional cylinders acting as compressors of the explosive charge. These cars were not entered for the race, but it was feared that similar attempts might be made to pump a charge into the cylinders and thus falsify the results of the race. The new rule says that at the moment of introduction to the cylinders the mixture must not be at higher than atmospheric pressure at 760 millimeters of mercury.

It is no longer necessary that the driver and mechanic should sit side by side. The latter may be behind the former, and probably will be in most cases, with a substantial decrease of head resistance. It is argued that stream line forms are to the final benefit of the car owner and should be encouraged and not discouraged in all races.

A return has been made to the conditions prevailing prior to 1906 by allowing work to be done on the cars by attendants and authorizing the establishment of depots at any point around the course. It was the experience of the late David Bruce Brown and the Peugeot driver Goux, both disqualified for taking gasoline on the course at Dieppe that has led the organizers to make this change. So far as tires are concerned, the difference will not be enormous, for with the general use of detachable wheels big tire changing staffs are not required.

Instead of a minimum chassis weight of 1,763 pounds, a maximum of 1,984 pounds has been imposed. It is believed that in the last two races manufacturers did not sufficiently study the problem of weight reduction, for while there were a few cars which held to the road perfectly although remaining very close to the minimum mark of 1,763 pounds, many of them were built up to nearly 2,000 pounds under the belief that lower weight cars would not stick to the road. The weight is taken without water, gasoline, oil, spares, tools, etc. The two men must scale 308 pounds, any deficit being made up by ballast. Entries for the race close on December 31, and at double fees on March 31. For a single car the ordinary fee is $200; for two cars, $360; for three cars, $500, and for a full team of four cars, $600. The place of the race has not yet been decided.

The sixteen cars which sent in their engagement for the Grand Prix of the Automobile Club of France (14 miles to the gallon) represent the firms Sunbeam, Peugeot, Delage, Mathis, Itala (with valveless type), Opel, and Schneider. The sporting committee of the A. C. F. will unite in a few days to decide what shall be done. There appears to be but two courses, either abandon the race altogether or allow entries to be received at ordinary fees until January 1. Probably the formeer course will be preferred, for the manufacturers object to being kept in doubt as to the holding of the race until such a late date as January.

The charge is made in certain quarters that the club is not at all enthusiastic over its own race, or it would have announced the event as certain whatever the number of cars received and fixed the closing of the lists after the European motor shows. From private sources it is learned that the French firms Peugeot, Delage and Schneider, as well as the English Sunbeam Company, will transfer their Grand Prix entry to the 3-liter or 183 cubic inches race. It is probable that Mathis, Itala and Opel will do the same. A big field for the 3-liter race is practically assured.

Colonels Enjoy Sociability Run

LOUISVILLE, KY., Nov. 11—Participants in the sociability run of the Louisville Automobile Club to Lexington returned home to-night. About 100 persons made the trip, over splendid roads and without mishap. The route to Lexington was via of Shelbyville, Frankfort and Versailles, with the entrants in the contest running in a bunch at the finish and with the average time of 4 hours, 23 minutes and 56 seconds. The winners, in order, are: A. J. Senf, Mrs. C. S. Gibson, Mrs. W. R. Nisbet, F. E. Van Patton, Dr. C. W. Karraker, A. B. Patterson, T. Trammel, Miss Virginia Weikel, Miss Lois Reid, Mrs. Ethel C. Standiford, H. W. Cooper, H. L. Lewman, E. C. Jacobson.

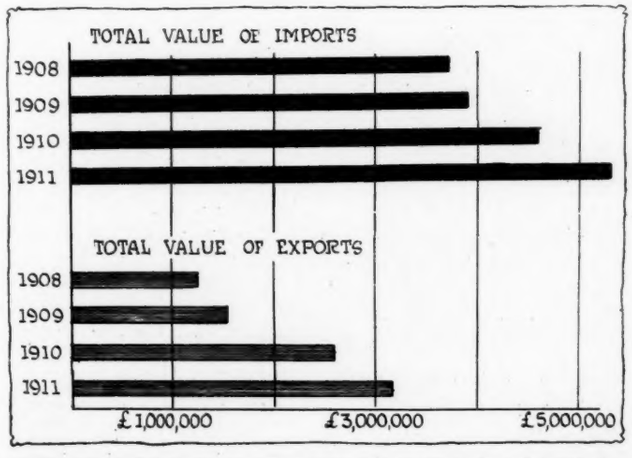
Savannah Wants Big Races Again

SAVANNAH, GA., Nov. 13—*Special Telegram*—Providing a sufficient number of entries are guaranteed, the Savannah Automobile Club wants the 1913 Vanderbilt Cup and Grand Prize races.

At a meeting of the club last night it was decided to apply for both races conditioned upon a minimum number of participants.

By Way of Correction

The description of the 1913 Stearns car, issue of October 31, should have stated that the Vesta generator is used in the lighting plant of these cars instead of the system named.



Values of Great Britain's total automobile imports and exports, including parts

Flanders—U. S. Motor Merger After Sale

Walter E. Flanders Will Assume Presidency—In Court, Interference by Minority Interests Is Checked and Order Issued To Frame Decree of Sale Providing for Virtual Auction in Six Parcels or as an Entirety—January Date Probable

DETROIT, MICH., Nov. 12—(*Special Telegram*)—Absolute confirmation of the reported merger of the Flanders Motor Company of this city and the United States Motor Company was given out last night following the decision of Judge Hough, of the United States District Court in New York in which he denied the petition of some of the stockholders of the United States Motor Company for intervention in its reorganization plans.

Walter E. Flanders will head the enlarged corporation and the headquarters of all the plants except that of the Stoddard-Dayton at Dayton, Ohio, will be moved to this city.

The plans as now formulated contemplate the purchase of the Flanders Motor Company for $3,750,000 of which $1,000,000 will be paid in cash and the remainder in stock.

It is stated that while W. E. Metzger and B. F. Everett will withdraw from active participation they still retain stock interests.

The bringing of the executive offices of the various United States Motors subsidiaries to Detroit means much to the city. The Sampson and Brush plants will probably be reopened, giving employment to some 500 additional workmen, while it will also mean the location of various manufacturers of parts here, so that in the end some 10,000 new workers will be added to the already great array of industrial operators now engaged in the many automobile lines in this city.

Officers of the Flanders organization could not be reached today so that it is impossible to get at details of the transaction other than those given.

Winding Up Legal Affairs in Court

What in effect is practically an auction sale has been ordered by Judge Charles M. Hough with regard to the assets of the United States Motor Company. Of course, there will be no "Going, Going—Gone" feature such as mark regular auction sales, but in the essential particulars the disposition of the property will be by an auction sale.

Next Monday the court has signified its intention to sign a final decree of sale and while the time for its consummation has not yet been fixed, it is certain that it will take place some time in January.

Under the form of order prepared Monday in the United States District Court the bidders will have the opportunity to bid on the assets divided into six parcels or on the whole as a single lot. A certain qualifying amount of cash or certified check will be required from each bidder and the deposits together with the formal bids may be placed in the custody of the court between the hours of 11 o'clock in the morning and 3 o'clock in the afternoon of the day fixed for the sale.

The auction feature arises from the fact that bidders will be allowed, under the tentative form of the final order, to increase their offerings at any time prior to the hour set for the closing of the sale.

The division of the assets will be along these lines:

Parcel No. 1 shall consist of all the property of the United States Motor Company.

Parcel 2, all the property of the Alden-Sampson Manufacturing Company; No. 3, Brush Runabout Company; No. 4, Columbia Motor Car Company; No. 5, Dayton Motor Car Company, and No. 6 Maxwell-Briscoe Motor Company. The parcels will be offered in the order of their numbering. Immediately after the bids have been concluded for the various parcels, the whole property will be offered as an entirety.

There was little comfort in the proceedings for the elements that have made objection to the immediate settlement of the company's affairs. They were on hand in court, but the rulings from the bench were against them. The three-headed demurrer which was informally filed on behalf of certain stockholders was dismissed. The demurrer alleged that the court had no jurisdiction; that insufficient facts were set out on the bill of complaint and took up other technical grounds. Judge Hough held adversely to the demurrer on the ground that the court did have jurisdiction; that sufficient facts were stated in the bill and that the affirmative action of the officers of the various defendant concerns bound the stockholders in the absence of allegations of fraud.

It was stated by one of the objecting attorneys that the court ought to name a referee to investigate the alleged shrinkage of assets between the time of the last annual report when it was shown that they footed up to over $23,000,000, while at the time the receivers completed their work there was a nominal loss of over $12,000,000. It was explained that the apparent shrinkage was due to the elimination of all items not directly representing some tangible assets from the report of the receivers and further that the last annual report of the company represented the assets in the light of the seller, while that of the receiver looked at the case from the buyer's point of view.

In referring to the future of the company, the court and attorneys informally considered the plan of reorganization. Judge Hough prefaced his remarks with a statement that the reorganization plan was not before him in his judicial capacity, but that it was a matter of common notoriety. He said: "Reading between the lines of the bill of complaint it is apparent that the creditors having assumed control of the company's affairs in June and having administered them up to the time of the receivership, found them in worse condition than they expected. The creditors should not assume the attitude of mortgage holders foreclosing upon the property of the debtor. The character of their claims is not of mortgage degree."

Mr. Curtis, representing a large amount of preferred stock, said that the creditors who were represented to the extent of $10,000,000 of claims by Joline, Larkin & Rathbone, were the only parties in position to bid on the assets when it came time for the legal sale. This, he explained, was due to the fact that they could put in their claims with the bids submitted, while all others would have to bid actual cash. Thus the situation resolved itself into a contest between paper and cash with all the advantage on the side of the paper.

A suggestion was made by James N. Rosenberg that an offer had been submitted to lease the Brush and Sampson plants in Detroit during the receivership. He said that if such a lease could be consummated it might help the whole property at the sale.

At the session it was not stated who the prospective tenant might be, but after adjournment it was announced that it might

be the Flanders Motor Car Company, although the definite statement was not made.

It was stated that the Flanders company required extensive manufacturing facilities and that as both the Brush and Sampson plants were practically closed down, the deal would be an excellent one from every point of view. The court gave assent to leasing the plants, but limited the term to the receivership.

Mr. Rathbone, of Joline, Larkin & Rathbone, said that the merger between the United States Motor Company and the Flanders Motor Car Company had been tentatively arranged on the best possible terms and that Walter Flanders would be the next president of the United States Motor Company, in all probability. He said that it would be impossible to make a more definite statement pending the action of the court. The proposed contract must be ratified by both sides, but it is said that it has been prepared in final form.

Mr. Rathbone said that the Flanders company would be taken over free from all but its current indebtedness, dealers' deposits and current accounts.

Fully 91 per cent. of the claims against the United States Motor Company have been deposited under the plan of reorganization and a considerable fraction of the remainder, consisting of about $1,000,000, would be deposited within a week.

The stock deposits are coming in at a slower rate. About $4,000,000 par value of both issues have been turned in, but the amount so deposited is of relatively small importance to the reestablishment of the company. It is estimated that the total deposits of stock under the plan will reach at least $15,000,000 out of a total of $23,000,000 outstanding. If that develops to be true, the burden to be carried by the underwriting syndicate will be only $1,920,000.

It developed at the hearing that one of the main elements in the problem of the receivers was to finance not only the 1913 manufacturing campaign, plans for which have been outlined and financed by the order of court, but the importance of the experimental campaign for 1914 was referred to as the principal hope of the stockholders.

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Hartz to Manage R. C. H. Company

DETROIT, MICH., NOV. 11—At a meeting of the directors of the R-C-H Corporation November 8, J. F. Hartz, president of the J. F. Hartz Company and officer and director of various other leading Detroit business concerns, was chosen general manager and treasurer of the corporation. Other officers for the coming year are: President, R. C. Hupp; vice-president, C. P. Sieder; secretary, L. G. Hupp and assistant general manager, F. R. Hupp.

The directors are G. W. Rogers and J. G. Robertson of Akron, C. G. McCutchin of Jackson, Mich., J. F. Hartz, John Kelsey, C. P. Sieder, F. M. Randall, J. H. Clarke and R. C. Hupp of Detroit.

The active management rests with an executive committee of five composed of Messrs. Hartz, Kelsey, Randall and R. C. Hupp of Detroit.

In entrusting the affairs of the corporation to Mr. Hartz, one of Detroit's most successful business men is brought actively into the industry. He is president of the J. F. Hartz Co., Ltd., of Toronto, Canada, and the H. H. Hester Co. of Cleveland, allied firms of the local concern. Mr. Hartz became actively associated with the automobile business 4 years ago when he organized the C. M. Hall Lamp Co. He is also vice-president of the Williams Brothers Company, director of the C. W. Warren Co., publisher of the Detroit Medical Journal and director of the Detroit Times Company.

F. R. Bump becomes assistant general manager.

As stated in these columns last week, 16,500 R-C-H cars have been contracted for by dealers in American and foreign countries for delivery during the season.

Export business for the year was exceedingly good, over 1,000 cars having been sold abroad in 41 foreign countries. From contracts already entered into abroad it is believed that between 3,000 and 4,000 cars will be required for export alone during the next 12 months.

The R-C-H plant consists of a completely equipped foundry, forge, machine shop, paint shop, assembly buildings, large power house, administration and other buildings. It has a capacity of 60 cars per day and during the heavy output season gives employment to 1,600 men.

The corporation maintains branches in New York, Philadelphia, Boston, Buffalo, Cleveland, Atlanta, Chicago, Minneapolis, Kansas City, Denver, Los Angeles, San Francisco, Detroit and Walkerville, Canada.

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Offer Made for W. C. P. Assets

The creditors' committee of Wyckoff, Church & Partridge, Inc., which corporation is now in the hands of John S. Sheppard, Jr., as receiver, have notified all creditors that an offer has been made by Howard C. Dickinson, of the firm fo Kearney & Dickinson; George A. Ellis, of the firm of Booth & Ellis, and Chester Griswold, of the Motors Engineering Company, for the assets of Wyckoff, Church & Partridge, Inc.

Should the creditors approve of this offer it is probable that Messrs. Dickinson, Ellis and Griswold will form a company to continue the manufacture of the Vaughan car and Commer truck. Mr. Dickinson and Mr. Ellis represent banking interests and Mr. Griswold in joining these gentlemen will act as the consulting engineer for the new company.

It is reported that both C. F. Wyckoff and E. S. Partridge are likely to be identified with the new interests should plans for rehabilitation be consummated.

H. B. Hollins & Company, bankers, are behind the committee. The amount of the offer is $150,000 in cash to be paid in instalments of $50,000 each, respectively 4, 8 and 12 months from the date of transfer.

The property included in the offer includes all the real and personal property of the bankrupt company except what is in possession of the Driggs-Seabury Ordnance Company or claims against that company. It consists of two New York leaseholds; furniture and fixtures; twenty-six Commer trucks; several Vaughan cars, bodies, etc., together with accessories; the factory building at Kingston, with its contents. Against the property are mortgages and bank liens of approximately $270,000.

John S. Sheppard, Jr., receiver, in a supplemental report to the United States District Court shows that according to his estimate there is the sum of $39,304 either in his possession or due to him and collectible as of November 1, thus making the total amount subject to division under the offer, $189,304.

The unsecured claims of the estate amount to $575,000. The appraised value of the property covered by the offer, adjusted to November 1 by deducting property sold, is about $171,000. This would mean, according to the calculation of Mr. Sheppard, a dividend of 25 cents to 27 cents on the dollar to the unsecured creditors.

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Colwell-Ideal Merger Accomplished

DETROIT, MICH., NOV. 9—The Colwell Lead Company of New York City has purchased the Ideal Manufacturing Company of Detroit, large manufacturer and jobber of plumbers' supplies and articles such as pet cocks, piping, joints, etc., for the automobile trade. The deal is one which involves considerable capital, and is perhaps among the largest to be consummated in this city in some time.

Both the purchaser and the Ideal company are old established firms, the former having been begun in 1866, while the latter has been doing business in Detroit since 1887. The consolidation will increase the capitalization of the greater organization to about $2,000,000 and it is stated that it will bring to Detroit additional capital and business and increased opportunity for the employment of labor.

Adams Patent Is Upheld

Injunction Against Hartford Rubber Works—Phillips Patent Does Not Cover Use of Anti-Skid Wire

A. A. A. to Have Chicago Meeting in December—M. A. M. Fixes Date for Annual Meetings

OVERTURNING the judgment of the United States District Court, District of Connecticut, the United States Circuit Court of Appeals has reversed the findings of Judge Platt in the suit of the Metallic Rubber Tire Company against the Hartford Rubber Works involving the Adams and Midgely treads. In the lower court Judge Platt dismissed the bill and found in favor of the Hartford company. The upper court sustains the Adams patent, decrees an injunction against the Hartford company and orders an accounting as between the parties and gives a decree for costs against the defendant.

The suit was instituted by the Metallic Rubber Tire Company alleging that the Hartford company infringed its patent rights under the Adams patent, as outlined in a former issue of THE AUTOMOBILE. The Hartford company responded by setting up defenses of invalidity, non-infringement, abandonment and want of equity and Judge Platt found for the defense, dismissing the bill in the first instance.

Appeal was taken by the complainant to the Circuit Court of Appeals and the full bench consisting of Judges Lacombe, Coxe and Noyes heard the arguments which were presented by Alfred Wilkinson for the complainant and E. W. Vaill for the defense.

Judge Noyes wrote the opinion, the more pertinent parts of which are as follows:

"Concededly the nearest approach to the patent in question is the Phillips English patent, and the question of anticipation may well be determined by examining that patent and comparing it with the one in suit.

"The principal object of the Phillips patent was to protect and strengthen pneumatic tires. It illustrates numerous ways for stiffening and protecting tires, and among others, points out that the tread or wearing portion may be reinforced or strengthened by stitching the rubber with metal wire, threads, cord and the like. Some of the drawings of the patent are very similar to those of the patent in suit. The prevention of slipping, however, is not stated to be either an object of the Phillips patent or a result of the use of its structure. Moreover, it is not clear that the non-skidding effect would be obtained by following the teachings and drawings of the Phillips patent.

Phillips Patent Points to Covering Wires

"Wire sewed into a tire to reinforce the rubber would naturally be flexible wire, while only stiff wire would furnish the hard bearings, required to prevent slipping, especially after the wearing off of the loops. The Phillips patent shows that rubber tires may be stiffened and protected by wire stitching but, in our opinion, does not teach that exposed wire stitching will make hard bearings to prevent skidding. Indeed, many things in the Phillips patent point in the direction of covering the wires and it is never essential that the stitches should be flush with the surface of the tread."

The court then dismisses the objection raised as to the validity of the Adams patent by commenting on the fact that the Hartford company has had a license to manufacture under a patent and upon the expiration of the license has put out a product which, even if not infringing, closely simulates the patented structure.

In conclusion Judge Noyes says:

"In our opinion, the defendant's structure infringes. The claim covers the combination of the wire and rubber as a result and we think that the defendant should not be permitted to escape the charge of infringement by combining its wire and rubber in a different way from the stitching or weaving illustrated in the specification.

"The decree of the District Court is reversed with costs and the cause is remanded with instructions to enter a decree for the complainant for an injunction, an accounting and costs."

A. A. A. To Meet and Dine in Chicago

The annual meeting of the American Automobile Association has been scheduled for December 2-3 at Chicago. The banquet, which is always a feature of the meeting, will be held at the Auditorium on the evening of December 2. It is expected that the attendance will be very large at all the sessions as well as at the banquet.

M. A. M. Schedules Annual Meetings

The Motor and Accessory Manufacturers will have a lively session during the annual show. The association will probably hold the only formal banquet of the 1913 show season and the program that has just been outlined includes numerous activities.

During the week that preceded January 15, all the committees will hold conferences either at headquarters, 17 West 42nd street, or at the Waldorf. These committee meetings have not been definitely scheduled, but will be held nevertheless. On January 14, the Board of Directors will assemble at headquarters to clean up the fag-end of the 1912 business. The following evening at 6 o'clock the annual meeting will be called to order at the Waldorf. The chief business to be transacted will be the presentation

Automobile Securities Quotations

THE whole list of automobile securities advanced during the past week with the exception of a few stocks. The greatest bulge was in Goodyear common which shot up to $400 a share bid with no sellers in sight. This is a net gain of $32 a share since last week and is due to the prospective character of the annual report, due next month. The skyrocketing of the stock may have been accomplished in some degree by a small panic among shorts but the basic reason for it is the expected melon. At this level Goodyear is worth $175 a share more than it was a year ago and its holders say it is cheap at that. The table:

	1911		1912	
	Bid	Asked	Bid	Asked
Ajax-Grieb Rubber Co., com	..	..	175	190
Ajax-Grieb Rubber Co., pfd	..	..	98	102
Aluminum Castings Co., pfd	..	..	100	102
American Locomotive, com	36½	37	44	44¼
American Locomotive, pfd	103½	104	106	106½
Chalmers Motor Company	..	..	145	152
Consolidated Rubber Tire, com	7	10	10	15
Consolidated Rubber Tire, pfd	10	20	50	55
Firestone Tire & Rubber, com	170	175	278	285
Firestone Tire & Rubber, pfd	106	108	105½	107
Garford Company, preferred	..	..	99	100
General Motors Company, com	38½	39½	33	35¼
General Motors Company, pfd	78½	79½	77	78
B. F. Goodrich Company, com	234	239	70	71
B. F. Goodrich Company, pfd	118	120	107	107½
Goodyear Tire & Rubber, com	225	235	400	410
Goodyear Tire & Rubber, pfd	104	106½	104½	105½
Hayes Manufacturing Company	..	..	..	90
International Motor Co., com	..	..	18	20
International Motor Co., pfd	..	..	74	76
Lozier Motor Company	..	..	40	50
Miller Rubber Company	..	..	143	147
Packard Motor Company, pfd	104½	106	105½	107
Peerless Motor Company	..	..	115	120
Pope Manufacturing Co., com	40	47	26	28
Pope Manufacturing Co., pfd	65	70	70½	72
Reo Motor Truck Company	8	10	8½	9¼
Reo Motor Car Company	23	25	20	22
Studebaker Company, common	..	..	41	43½
Studebaker Company, preferred	..	..	94½	97
Swinehart Tire Company	..	..	99	101
Rubber Goods Mfg. Company, com	85	95	100	..
Rubber Goods Mfg. Company, pfd	100	105	104	108
U. S. Motor Company, com	23	25	⅛	¼
U. S. Motor Company, pfd	67	68	½	1
White Company, preferred	..	..	105	108

of annual reports and the election of four directors. The annual session of the association is always very brief and at 8 o'clock the members will move over to the College Room, where the annual banquet will be spread.

The directors will assemble on January 16 to choose officers for the ensuing year. No slate has been proposed so far, and following the usual course the selection of the new officers will be accomplished with as little formality as possible.

The following members were elected to the Motor and Accessory Manufacturers at the last meeting of that organization: John W. Blackledge Manufacturing Company, Chicago; James L. Gibney Rubber Company, Philadelphia, and the Westinghouse Electric & Manufacturing Company, East Pittsburgh.

S.A.E. Committees to Hold Meetings

The regular monthly meeting of Council of the Society of Automobile Engineers was scheduled for Wednesday morning. The program consisted of hearing the treasurer's report; considering about forty applications for membership; transfers in the various classes of membership; settling the details of the winter meeting of the society which is scheduled for January 16-18 at the Hotel McAlpin with the annual banquet on January 17.

The society is arranging to receive the visit of the British engineers next summer. The party, according to latest estimates will consist of from thirty to forty members and will be somewhat in the nature of an official repayment of the visit of the S.A.E. to England last year.

A revision of the by-laws is also in contemplation.

The Truck Wheel division will hold a meeting Wednesday afternoon to take up and consider a number of minor changes in the recommended standards.

Market Changes for the Week

DURING the past week the market has experienced its usual variance in prices. Open-hearth, for instance, rose $1.00, due to heavy trading, while tin declined $.02 from lack of trade. Bessemer steel remained at its old price of $28.00 per ton. Rubber rose $.02 due to London influences, as did copper electric and copper lake, both increasing $.00 1-8 per pound, closing Tuesday at $.17 3-8 and $.17 1-2 respectively. Lead, antimony, gasoline and beams and channels, were constant throughout the week. The chemical market experienced no change, cyanide potash and sulphuric acid both closing at their old prices of $.19 and $.99 respectively.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, per lb..	.09¼	.09¼	.09¼	.09¼	.09¼	.09¼	.....
Beams & Channels, 100 lbs...	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	28.00	28.00	28.00	28.00	28.00	28.00	.....
Copper, Elec., lb.....	.17¼	.17 7/20	.17 7/20	.17 7/20	.17⅜	.17⅜	+ .00⅛
Copper, Lake, lb.....	.17⅜	.17½	.17½	.17½	.17½	.17½	+ .00⅛
Cottonseed Oil, Nov., bbl.....	5.82	5.86	5.78	5.83	5.86	5.86	+ .04
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil (Menhaden) ...	.33	.33	.33	.33	.33	.33	.....
Gasoline, Auto, 200 gals. @....	.21	.21	.21	.21	.21	.21	.....
Lard Oil, prime...	.90	.90	.90	.90	.90	.90	.....
Lead, 100 lbs.....	4.75	4.75	4.75	4.75	4.75	4.75	.....
Linseed Oil.....	.58	.58	.58	.58	.58	.58	.....
Open-Hearth Steel, ton.....	29.00	29.00	29.00	29.00	28.00	28.00	—1.00
Petroleum, bbl., Kansas crude...	.70	.70	.73	.73	.73	.73	+ .03
Petroleum, bbl., Pa., crude.....	1.65	1.65	1.70	1.70	1.70	1.70	+ .05
Rapeseed Oil, refined	.69	.69	.69	.69	.69	.69	.....
Rubber, Fine Up-river Para..	1.02	1.04	1.04	1.04	1.04	1.04	.02
Silk, raw Ital.....	....	4.40	....	....	4.40	....	.....
Silk, raw Japan...	....	3.95	....	....	3.92½	....	— .02½
Sulphuric Acid, 60 Beaumé	.99	.99	.99	.99	.99	.99	.....
Tin, 100 lbs.....	5.00	5.02	5.00	5.01	4.98	4.98	— .02
Tire Scrap.....	.09¾	.09¾	.09¾	.09¾	.09¾	.09¾	.....

Marvin on Car Shortage

Explains That Limited Number of Railroad Freight Cars Are Useful for Automobile Transportation

Local Dealers Should Co-operate with Factories for Prompt Return of Freight Cars

IN the belief that a full understanding of the question on the part of the several thousand automobile dealers in the West and South will be of value in helping the car situation at automobile factories and inducing the return of automobile freight cars to the manufacturing territory, J. S. Marvin, General Traffic Manager of the National Association of Automobile Manufacturers, Inc., has outlined the situation as follows:

"There is a certain limited number of freight cars having wide side doors or end doors into which automobiles can be loaded. There are twenty times as many box cars into which automobiles cannot be loaded because they have doors too small. The automobile cars are scattered all over the country. They are being used for other freight in the West and South instead of being returned to the territory where automobiles are manufactured. The result is that even thus early in the season it is impossible to secure automobile cars fast enough at the factories to get out the shipments of finished machines.

"The situation is therefore going to become critical unless those automobile cars that are being held in the South and West are located and sent back to the automobile manufacturing territory.

"Therefore, each dealer should take this matter up with his local freight people as follows:

"First—The important point is the disposition made of an automobile car after you unload it. If the local freight agent or superintendent permits some shipper to load it farther South or farther West, the car is lost to the automobile industry for weeks or months.

"Second—Your local freight agent or superintendent would not permit this abuse of automobile equipment if he realized how serious a matter it is and that you are interested in what becomes of that automobile car after you have unloaded it.

"Third—Your patronage is valuable to your local freight agent and the railroad he represents. You can exact, in return for this patronage, their cooperation in solving this problem which faces the automobile industry and the railroads in the manufacturing territory upon which the burden of supplying these cars to the factories rests.

"Fourth—The cooperation that you should exact is that they confine the loading of automobile cars to points in the automobile manufacturing territory; this applies to cars that you unload and also any other automobile cars that may happen to come to your station loaded with other goods and thus be under local control when made empty; request your freight agent to report to you the disposition made by him of cars which you unload.

"Fifth—You should advise the factory of every instance wherein your local freight agent or superintendent fails or refuses to comply with this request.

"You can readily see what a great help it is going to be if every dealer in the West and South follows this matter up; they are in close touch with the situation where the trouble exists. If these cars are not sent back it is going to be impossible to ship machines from the factories."

It will be remembered that during the past few weeks, as during the corresponding period of 1911, the limited supply of freight cars presented a serious obstacle to the business of hundreds of dealers.

Exports for 9 Months Increase 55 Per Cent.

From January 1 to October 1, 1912, American-Made Automobiles Sold Abroad Totaled $21,859,709

American Automobile Imports of France Increase—Gain Is 78 Per Cent., or $285,420, to September

WASHINGTON, D. C., Nov. 12—The summary on commerce and finance issued by the Bureau of Statistics shows that the total imports of automobiles and parts for September were $42,000 more than they were during the corresponding period of 1911. The comparison is as follows:

September, 1912	$189,901
September, 1911	147,295

The showing for the first 9 months of the calendar year, however, indicates a decrease in the total imports of $60,000. The figures are:

First 9 months 1912	$1,625,908
First 9 months 1911	1,685,816
First 9 months 1910	2,214,920

These figures show that there has been a steady decrease in the use of foreign made automobiles in the United States.

In the matter of exports a material increase is shown for the month and for the first 9 months of the calendar year. The following export figures tell the story:

September, 1912	$1,720,815
September, 1911	1,336,822

For the 9 months ending with September the showing is as follows:

1912	$21,859,709
1911	13,988,293
1910	10,419,999

Canada again takes first rank as a purchaser of exported automobiles, taking $473,465 during September, 1912.

Crude Rubber Steady in New York

Despite some weakness in the market for crude rubber in London, the New York trading was on a steady foundation based upon about $1.04 for up-river fine. The British downward movement amounted to about 2 cents a pound, but the response locally was small. The demand was largely of a jobbing character and there were some bids for the better grades just under the market. This condition did not have its usual effect of checking the volume of offerings and as a result trade was of satisfactory scope.

Benjamin Briscoe, retiring president of the United States Motor Company, was the guest of honor at a banquet given by officers and employees of the United States Motor Company in the Hotel Astor. The banquet was intended as an expression of the esteem in which Mr. Briscoe is held by the members of the organization, and their tribute to him not only included the well wishes of the employes but was manifested by the gift of a handsome Tiffany watch and fob from the men and a large bank of chrysanthemums from the young women of the company.

Crops Greater than First Reports

WASHINGTON, D. C., Nov. 11—Predictions made in the past few months of bumper crops in the big agricultural sections are being justified by bulletins just issued by the Department of Agriculture in which comparisons are made, not only with the 1911 crops, but, also with the average yield of recent years. Not only in the real agricultural centers but in practically every section of the country the story is the same, a decided percentage of increase over 1911, and over the average yields of recent years. In the grain states such as Illinois, Wisconsin, Iowa, Missouri, Kansas, Colorado, the Dakotas, Nebraska, Wyoming, Texas, etc., the percentage of increase in production is so great as to insure a year of exceptional prosperity for the people of these sections. In the estimates made by the department, as above suggested, the crops of all kinds are combined, and only the states specified.

Preliminary estimates, however, of certain crops, taking the production as a whole, and not specifying the localities, tell the same story. As compared with 1910 and 1911 the year 1912 will produce the following:

	Production		
Crops	1912	1911	1910
Corn, bushels	3,169,137	2,531,488	2,886,260
Wheat, bushels	720,333	621,338	635,121
Oats, bushels	1,417,172	922,298	1,186,341
Barley, bushels	224,619	160,240	173,832
Rye, bushels	35,422	33,119	34,897
Buckwheat, bushels	19,124	17,549	17,598
Flaxseed, bushels	29,755	19,370	12,718
Potatoes, bushels	414,289	292,737	349,032
Hay, tons	72,425	54,916	69,378
Tobacco, lbs	959,437	905,109	1,103,415

Some 1913 Factory Expansions

KENOSHA, WIS., Nov. 11—The Thomas B. Jeffery Company, Kenosha, Wis., manufacturing the Rambler, is at this time more than 700 cars behind its orders for immediate delivery and has on its books contracts for 40 per cent. more cars than were produced by the works throughout the 1912 season. The new and sole Rambler model for 1913 was announced only 73 days before November 1, and this condition is due in a large measure to intensive sales methods evolved by the Jeffery forces in marketing the 1913 Rambler Cross-Country, with unit gasoline-electric power plant, as its sole model. During the period from July 15 to October 15, fifty salesmen engaged in a contest. Ten prizes were awarded. This contest greatly increased the number of orders in all sections of the country.

HARTFORD, WIS., Nov. 11—The Kissel Motor Car Company, of Hartford, Wis., intends to continue its building and expansion activity throughout the cold months, more as a matter of necessity than convenience. Work has just been started on a large addition to the woodworking plant and another core oven is being built in the foundry department. As soon as these improvements are well along, attention will be turned to the work of providing more facilities for the commercial vehicle division, which is now cramped for room.

SYRACUSE, N. Y., Nov. 9—The H. H. Franklin Manufacturing Company announces that it will make this season 1,800 cars. The only changes will include some features of refinement and but one car will be added to the line, a victoria phaeton on the Little Six chassis with a 30 horsepower motor. Forty per cent. of Franklin sales the past year have been on the Little Six model.

French Imports from U. S. Increase

PARIS, Nov. 1—Out of a total imports of automobiles into France during the first 8 months of 1912 valued at $1,765,860, the United States sent cars to the value of $578,340. The total shows an increase, for during the same period of 1911 France imported $1,692,420 worth of foreign automobiles, of which $338,580 came from America. It will thus be seen that the American increase is high. The total French exports for the period January 1-August 31, 1912, shows an increase of $6,066,060 compared with the corresponding period of 1911. The increased business was done with Great Britain, Germany, Belgium, Switzerland, Spain, United States, Brazil, Argentine, and

Algeria. The following are the official figures of French exports for the first 8 months of 1911 and 1912:

	1911	1912
England	$7,301,040	$7,883,400
Belgium	3,777,480	6,041,880
Algeria	1,404,540	2,228,040
Germany	1,748,160	2,203,380
Argentine	1,184,700	1,873,200
Brazil	801,240	1,213,920
Switzerland	656,400	683,220
Spain	360,000	656,580
United States	368,460	653,880
Italy	548,180	328,860
Russia	382,560	236,100
Austria-Hungary	355,140	148,680
Turkey	255,600	96,000
Other countries	2,060,940	3,024,360
	$21,205,440	$27,271,500

Hoosiers Invading Illinois Field

INDIANAPOLIS, IND., Nov. 11—About 150 members of the Indianapolis Trade Association will leave on a special train tomorrow for a 3 days' trade extension trip through Illinois. Several tons of advertising matter will be carried and the Indianapolis News Newsboys' Band will give a band concert in each city and town where a stop is made. The association is made up of about 250 manufacturing, jobbing and wholesale concerns of the city, including all lines of trade. Practically all of the motor car manufacturers of the city are members of the association.

The itinerary tomorrow will include stops at Danville, Muncie, Fithian, Ogden, St. Joseph, Urbana, Champaign, Mahomet, Mansfield, Farmer City, Leroy, Downs and Bloomington, where the party will spend the night.

On Wednesday stops will be made at Heyworth, Wapella, Clinton, Maroa, Decatur, Harristown, Niantic, Illinopolis, Buffalo, Dawson, Riverton and Springfield, where the night will be spent.

The itinerary for the third day will include stops at Rochester, Breckenridge, Edinburg, Taylorville, Owaneco, Pana, Tower Hill, Shelbyville, Windsor, Gays, Mattoon, Charleston, Ashmore and Kansas.

Box Ball Concern to Make Automobiles

INDIANAPOLIS, IND., Nov. 11—The American Box Ball Company of this city, of which the chief owners are J. I. Holcomb and Fred Hoke, is about to embark in the automobile business and expect to put out a six-cylinder car to sell in the neighborhood of $2,750. No details of the new car have yet been announced.

Mr. Holcomb is not by any means new to the automobile trade, having been one of the partners in the Willis, Holcomb & Haywood Company a few years ago, who controlled the local agency for the Packard and several other cars.

Receiver Named for Dayton Company

DAYTON, O., Nov. 11—William Miller, formerly bookkeeper for the Dayton Automobile Company, Dayton, O., has been appointed receiver for the concern by Judge O. B. Brown. The application was made by T. J. Weakley, vice-president of the concern, and other stockholders. The suit is an amicable agreement between the stockholders and officers, and the business will be continued for several weeks, pending the dissolution of the firm and the sale of is assets. The officers of the company are: J. E. Sudebaker, president; T. J. Weakley, vice-president; A. S. Iddings, secretary, and Dr. I. N. Agenbroad, treasurer.

BUFFALO, N. Y., Nov. 12—The Frey Auto Supply Company, filed a petition in voluntary bankruptcy yesterday afternoon with the clerk of the United States District Court. Total liabilities are said to be $18,500.87 with assets of $22,344.55, most of the creditors being Buffalo firms. The largest creditor, however, is Lockwood, Luelkenger, Henry Company, of Cleveland, O., which claim amounts to $981.60.

Imperial Club Rules Motordom in Russia

Injured Personal Feelings of American Dealer Tend to Bring About Faction in Exhibition Work

American Business Man in Czar's Capital Says That the Opportunities for American Automobiles Are Great

THE AUTOMOBILE has received a communication from Charles L. Preston, an American business man stationed in St. Petersburg, Russia, outlining the conditions that surround the automobile industry and annual shows held in the Russian capital. Mr. Preston makes a special plea to the American industry to take part in the Russian show.

"ST. PETERSBURG, Oct. 29—As an American, having resided in Russia for the last 9 years as the manager of the Walk-Over Shoe Company's Russian business and as resident buyer for eight large American tanners, I naturally interest myself in American business in Russia, and wish to call the attention of every automobile dealer and manufacturer to the following facts:

"The Imperial Automobile Club, of Russia, located in St. Petersburg, practically controls the automobile and motor life of Russia, having as a patron and supporter his Imperial Majesty, the Emperor. The club gives every year one or more endurance contests and an exposition for the exhibiting of all kinds of motors with their accessories. This exhibit is open to all the automobile dealers and manufacturers of the world without reservation or discrimination; even the spaces for exhibiting purposes are drawn by lot, so that every exhibitor has an equal chance with his competitor. The club has even made arrangements possible in order to attract exhibitors.

"Russia has no automobile factories of her own, consequently the Imperial Club must look for foreign exhibitors, so it is naturally a foregone conclusion that the club will offer all the inducements possible in order to attract exhibitors and to make each exposition more successful than the previous one.

"Unfortunately for all concerned the Imperial Automobile Club was recently forced, by the demands of the other manufacturers and dealers selling automobiles in Russia, to publicly deny in the interest of accuracy and fair play certain statements and representations, made by the Russian agent of one American company doing business in Russia. By doing this the Imperial Automobile Club has incurred the enmity of this agent to such an extent, that the latter as a measure of revenge is endeavoring to organize a rival show to take place at the same time as the official exposition. This is certainly a very foolish move as the Imperial Club has a tremendous influence on the motor future of Russia and any manufacturer or dealer who exhibits at this proposed rival show forfeits all chance of taking part in any government trials or receiving prizes or awards.

"This agent is at the present time in America and is without doubt trying to discourage manufacturers or dealers who have intentions of sending exhibits to Russia from sending them to the official exposition.

"Personally, I dislike to be involved in any controversy, but in the first place as an American, with American interests at heart, and in the second place as a member of the Imperial Automobile Club, I wish to correct any false impressions which may have been caused by the above unpleasant incident and wish to assure any and every American manufacturer and dealer who has any wish or idea of exhibiting at the coming exposition in St. Petersburg next May that he will be heartily welcomed and will be treated with the greatest courtesy and consideration."

Two Methods for Perfecting All Grades of Steel in the Ingot—Gear Speed Matters Illustrated—The Variations in Brinell Tests—Lead Battery Negative Plates Improved by Inert Admixture—Easier Steering of Heavy Trucks

SOUND Steel Ingots—The constant temptation at steel works and rolling mills to make the discard from steel ingots shorter than it should be has resulted in many fatal flaws in the steel shapes rolled from the top end of an ingot or from a billet of the defective material. In the case of expensive steels, compressive molds have been used to some extent to squeeze the pipe and the blowholes out of the ingot while it is still in the fluid state and to concentrate the segregation of impurities in a small upper layer. Two new methods have now been perfected which are much cheaper and more effective. Sir Robert Hadfield, of the Hecla Works at Sheffield, England, has developed one of these and Dr. Hans Goldschmidt, of Essen, Germany, the other. Both are in the very front rank as practical and successful metallurgists, and the new methods therefore warrant the hope that in the near future defects will be a rarity in the very large bars of steel from which crankshafts and some other automobile parts are forged, although such bars are necessarily rolled from those large-sized ingots in which the defects have been most commonly encountered. The Hadfield method is indicated in Fig. 1. It consists in heating the fluid steel in the upper part of the ingot, or other mold which may be used, and maintaining it in a liquid condition, while the rest of the ingot is cooling, by playing a blast of air into charcoal heaped on top of the molten metal. To prevent loss of heat by radiation from the metal a layer of cupola slag is placed between it and the coal. The general result is that the fluid top-portion of the ingot sinks and fills the pipe as fast as it is formed. Pipes in the lower portions of the ingots are obviated at the same time, as these are also caused by irregularities in the cooling and the molecular flow in the metal and the top-heating regulates this factor to some extent throughout the mass. It is figured from the experience of the past few years, applying to a production of many thousands of tons, that the discard may be reduced from an average of about 20 per cent. to about 7 per cent. with an all-around gain in the quality of the product and that the saving on a large output may amount to from 8 to 12 shillings per ton, the value of the discard metal for remelting being fully considered.

The Goldschmidt method consists in an important modification of a similar method which had been previously tried without definite success. As generally known, Goldschmidt is the discoverer of the thermit material by means of which local fusion of metals may be readily effected, and his system for producing sound ingots consisted at first in sinking a can of this material into the top of the ingot after a crust had already been formed thereon. This caused the remelting of the portions surrounding the already formed pipe, and as soon as the remelting was effected the hole was filled by pouring in fresh liquid steel from the ladle. But the results were not satisfactory. Now the method consists in plunging the sheet-metal cartridge filled with thermit down to the bottom of the ingot before solidification has set in and before any of the defects have been developed. Fig. 2 shows the form of the cartridge and the rod used for pushing it through the fluid ingot. Owing to the action of the thermit, the method is mainly of advantage in the case of steel to which no silicon has been added either in the furnace or in the ladle, while on the other hand, according to Dr. Goldschmidt, any method which depends upon top-heating is inapplicable unless the steel is siliconized. The effect of the new thermit process is to cause a strong ebullition of the liquid contents of the ingot mold with violent expulsion of the gases which are just beginning to separate from the mass. This drives the segregation upward. Another effect of great value is that the metal in the mold sinks down more than a hand's-breadth and that the density of the material is increased in proportion to the reduction of its volume. In the case of plates made from slabs treated in this manner it was found that only 0.3 per cent. of the plates had to be rejected on the ground of faults traceable to the ingots, while the rejection at many works amounts to 15 per cent. This applied to the production from 4,000 ingots varying in size from 1 to 8 tons. In all 17,891 ingots from 1,436 different heats were treated by the new thermit process at the Schultz-Knaudt steel works from November, 1911, to July, 1912.—From papers reprinted in *Engineering* of October 4 with many illustrations.

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FOUR or Three Gear Speeds in Trucks—To show the advantages obtained by having four gear speeds rather than three in heavy motor trucks Captain Renaud of the French army, who was associated with the one-month trials of army motor trucks held this year within a 30 mile radius of Versailles, sets forth the points at which there will be a difference in the operation of two trucks, both weighing 6 tons with load and both developing a power of 1235 kilogrammeters at the wheel rims, but one equipped with four gear speeds and the other only with three. With the power mentioned both will be able to climb a 15 per cent. grade at a speed of 1.20 meter per second on the low gear and both can reach a speed of 5 meters per second on a 2 per cent. grade on the high gear.

IN THE CASE OF FOUR GEAR SPEEDS

With a gear scale arranged in geometric progression, the quotient being 1.6, the four vehicle speeds of the truck when the motor turns at its normal speed are:

1.20 meter....1.92 meter....3.07 meters....5 meters.

and from the number of kilogrammeters available at the wheel rims it may be deduced that the road grades which may be climbed at these speeds are in round figures, respectively: 15 per cent., 9 per cent., 5 per cent. and 2 per cent.

The diagram, Fig. 3, may be drawn on this basis, the grades being marked on the abscissa axis *ox* in number of centimeters of rise for each meter of distance and the vehicle speeds in meters per second on the ordinate axis *oy*. In considering what will take place at the various combinations of speeds, it should of course be remembered that poor road conditions may be equivalent to grades in necessitating the use of the lower gears.

The curve A represents approximately the progressive varia-

tion of the truck speed for all grades from level to 17 per cent. on the low gear. On the same plan the curves B, C and D may be drawn, corresponding to second, third and high speed gears. The limit curve drawn tangentially to A, B, C and D at *a, b, c* and *d* represents the vehicle speed which the motor should be capable of imparting, according to the grade to be climbed, while developing continuously its maximum power, and provided the gear speed could be changed gradually instead of step-wise. The triangles *dpc, cnb* and *bma* indicate the imperfection of a step-wise gear system. The most obvious practical conclusion from the diagram is, however, that for all speeds other than those corresponding exactly to the points *a, b, c* and *d* it is impossible to utilize the motor at exactly its most economical speed, and that this shortcoming will be so much more onerous as the points *m, n* and *p* are farther removed from the theoretical curve *abcd*.

IN THE CASE OF THREE GEAR SPEEDS

The two extreme speeds are the same as before and the intermediate gear may be chosen so as to give, for example, a vehicle speed of 2.4 meters per second, or twice as high as on low gear. [To get the best possible results it should be lower, however, and the disproportion in the selection made is indicated plainly in diagram Fig. 4 by the great difference in the areas of the two triangles $a_1m_1b_1$ and $b_1n_1c_1$. Through this disproportion the showing made by the author against the three-speed gear has been somewhat aggravated.—Ed.]

Under these conditions the grades which the truck may climb at normal motor speed are in round figures: 15 per cent., 7 per cent. and 2 per cent.

The diagram may now be drawn as before and Fig. 4 shows by the larger areas of the shaded triangles the larger variations from the best and most economical motor speed which it is necessary to submit to.

A numerical example brings out more sharply the advantage of the four-speed gear for trucks. Suppose that a day's trip of 100 kilometers includes 15 kilometers of 4 per cent. grade, 1 kilometer of 7 per cent. and 2 kilometers of 9 per cent. With four gear speeds the 4 per cent. grade can be taken on third at 3.5 meters per second, and the 15 kilometers will be traversed in 1 hour 11 minutes 25 seconds. The 1 kilometer of 7 per cent. grade will require the second gear giving a vehicle speed of 2.3 meters and an elapsed time of 7 minutes 14 seconds. The 2 kilometers of 9 per cent. grade will be covered on second gear, giving 1.9 meter vehicle speed and an elapsed time of 17 minutes 32 seconds. The total time spent on the grades will thus be 1 hour 36 minutes 11 seconds.

With three gear speeds only, the same grades will be climbed as follows: The 15 kilometers on second gear, working up to 3.1 meters vehicle speed per second, in 1 hour 20 minutes 38 seconds; the 7 per cent. kilometer also on second but at a reduced vehicle speed of 2.4 meters, making the time 6 minutes 57 seconds; the 2 kilometers of 9 per cent. grade on low at 1.6

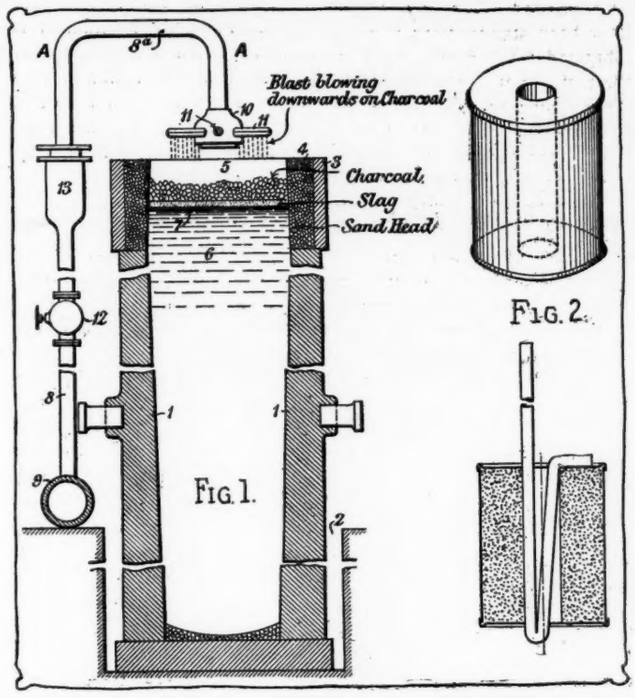

Fig. 1—Hadfield method for producing sound steel ingots. Fig. 2—Thermit cartridge used by Goldschmidt

meters and in 20 minutes 50 seconds. The total time spent on the grades will thus in this case be 1 hour 48 minutes 25 seconds. The time loss as compared with the four-speed truck is for the day 12 minutes 14 seconds. If the motor consumes 0.4 liter of gasoline per horsepower-hour or 9.6 liters per hour, the four-speed gear box results in an economy of about 2 liters for the day.—From *La Technique Automobile*, September.

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BRINELL Test Probed—Despite the very general adoption of the Brinell method for testing the hardness or density of a metal by measuring the impression made in it by a steel ball of given diameter and under a given pressure, and of deciding the tensile strength in a rough and ready manner by multiplying the density number on the Brinell scale by a constant, there has been a suspicion in many quarters that this convenient testing method should be accepted only with many reservations. It has been conceded from the start by its author that the figures obtained by means of it have mainly a relative value and that only those derived from tests made with balls of the same diameter and under the same pressure should

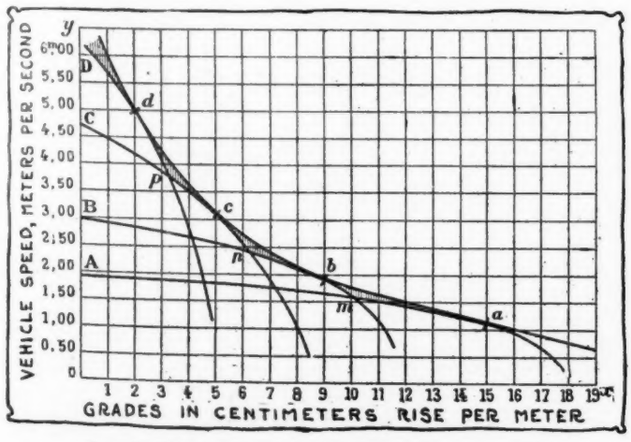

Fig. 3—Utilization of motor with four gear speeds

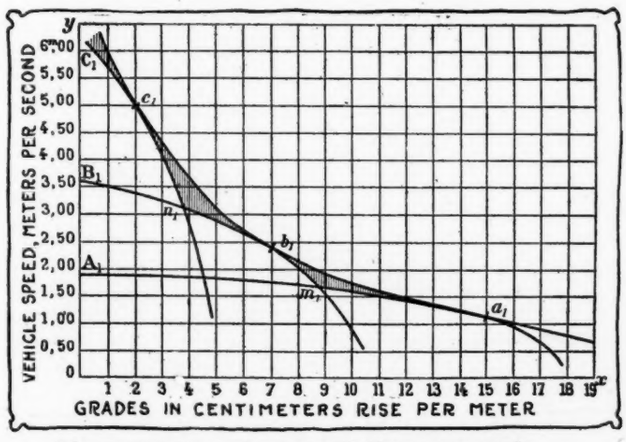

Fig. 4—Utilization of motor with three gear speeds

be compared. With this limitation in view the testing machines have been standardized in two sizes and the hardness number is tabulated from a conversion formula in which the diameter of the ball and the pressure are both considered; see details in THE AUTOMOBILE of July 4. It has, however, been found by Prof. Prandtl that the method is entirely inapplicable to cast iron.

Now the results of a searching analysis of the method, conducted by Mr. Hanriot, have been presented to the *Académie des Sciences* by Mr. Henry Le Chatelier, and while the facts mentioned by the investigator confirm the suspicions by which the research was prompted they also point out a corrective to the method lending it a greater scientific value while not detracting from its industrial convenience.

Hanriot shows first that aluminum bronze gives a density of 95 when a pressure of 1,000 kilograms and a ball of 10 millimeters diameter is used and only 67 with a pressure of 30 kilograms and a ball of 3 millimeters diameter; that nickel likewise gives 80 under the first condition and 60 under the other and coin silver 68 and 55. [Mr. Hanriot does not use the approved conversion formula, however, but obtains his density number by simply dividing the pressure figure by the figure expressing the area of the impression of the ball. His investigation is purely scientific.—ED.]

Lead is found to give the same density number whether the ball and the pressure are large or small, and from this the author inferred at first that the variation in the results with harder metals is due to the *écrouissage*—molecular upsetting—of the metallic structure of the latter. To test this inference he measured the density of a plate of nickel, getting 80 under a pressure of 1,000 kilograms and 61 under a pressure of 30 kilograms. He then filed away the imprints and measured the metal immediately under each of them by means of the small ball and small pressure alone. This gave the figures 117 and 67, showing that the metal had been affected by the very pressure of the balls previously used, and naturally more by the heavy than by the light pressure. It then occurred to him to see if annealing would remove the upsetting and make the reading alike for different pressures and ball diameters, but it was found that while repeated annealings gradually reduced the density figure very considerably, it did so in almost exactly equal degree for the heavy test as for the light one. The relation between two corresponding figures was a constant for all conditions, showing that molecular upsetting does not invalidate a test, although it had been shown previously, as referred to, that a test cannot be repeated in the same place of the metal where another test has been made without recording the structural effect of that test. Numerous experiments with different metals showed that the relation between the figures obtained with heavy and with light pressures was always a constant for any one material in the same structural condition and that therefore, once this constant is known, the density may be determined with any chosen ball diameter and pressure whose effects have been recorded [thus confirming the principle of the Brinell conversion formula and the tables based on it.—ED.] The constant was found to be 1.45 for aluminum bronze, 1.33 for nickel, 1.18 for coin silver, 1.02 for gold and 1.00 for lead.

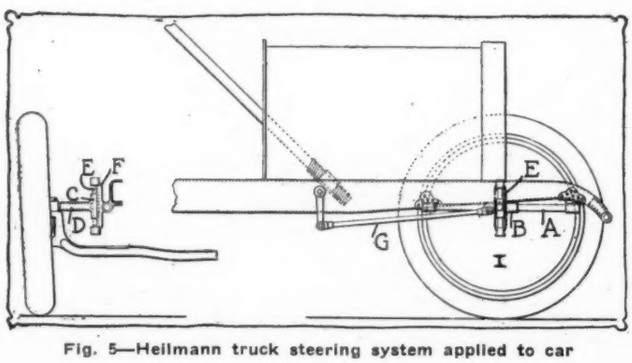

Fig. 5—Heilmann truck steering system applied to car

Another conclusion drawn by the experimenter from the facts ascertained by him is that the Brinell method gives far too high figures for annealed metals, as, for example, the hardness of aluminum bronze is much inferior to 24, which is the figure obtained after many repeated annealings and after obtaining 94 from the first test of the unannealed metal. The test seems to give a complex figure in which the hardness or density and also the facility with which the structure may be upset are combinedly recorded.

It is seen, he continues, that the results of the experiments are insufficient to explain the different readings obtained with different pressures. There is a source of error whose importance it is difficult to estimate. This is the elasticity of the metal. In reality, the imprint which should be measured is that existing at the moment the pressure is applied. The imprint which is actually measured is smaller, as the metal comes back resiliently when the pressure ceases. This exception to the method is confirmed by the fact that it is the relatively inelastic metals, such as lead, gold and silver alloy, which give the smallest difference in the direct readings under different pressures. The Brinell method gives thus only a gross idea of the density of metals, but even so its practical importance remains unimpaired, provided the figures obtained from it are used only for comparative estimates and are not supposed to possess absolute intrinsic value.—From *Génie Civil*, October 26.

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LIFE of Storage Battery Plates—Two experimenters, Messrs. Askenasy and Putnoky, obtained from the factory of Gottfried Hagen, near Cologne, Germany, battery plates which had been prepared with chemically pure materials, and some of the negative plates were subsequently immersed in a solution of barium salt and sulphuric acid, so as to cause a deposit of inert sulfate of barium in their active material. They then proceeded to determine the effect of these deposits upon the capacity and life of the plates. In order to reduce the duration of the test they subjected them to successive charges and discharges lasting one-half hour each and produced by currents much stronger than normally used. After 500 to 750 discharges they restored the material of these plates by a fundamental charge in opposite direction. It was then established by the tests that the capacity of the plates at first increased slowly, in all of them, up to about 500 discharges. Thereafter it dropped rapidly, but less rapidly in the plates containing inert matter than in the other ones. The general result of the investigation was thus that the addition of inert matter is without influence until the capacity of the negative plates has been developed to its maximum and begins to decrease, and it was also ascertained that the total life of the plates is notably increased by the admixture.—From *Zeitschrift für Electrochemie*, June 15.

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PROPOSED Steering System—In connection with the Heilmann truck wheel, which was illustrated and described in part in THE AUTOMOBILE of October 31, a steering system has been proposed which has the advantage over the customary method that the leverage with which force is applied grows larger instead of smaller the more the wheels are turned. Also, the steering rod moves in one plane, so that ball joints become unnecessary. A guide rod, A in Fig. 5, is secured to the frame reach. The sleeve B is mounted to slide upon it and forms a part of the knuckle F with pin E, upon which there is mounted the sleeve C with hollow lever arm D adapted to telescope upon a pin integral with the steering pivot and wheel spindle. Sleeve C can slide up and down on pin E in conformity with the action of the vehicle springs. The steering gear control is the usual one and the steering rod G attacks the sleeve B, moving it forward or backward on the rod A. The usual tie-rod connection from one wheel to the other is contemplated but is not shown in the drawing. The type of truck for which this steering system was specially designed has the spring suspension built into the wheels.—From *Bulletin Officiel*, September.

Overheating the Engine

What Causes a Lasting Rise in the Temperature of the Water Circulated To Cool the Motor Cylinders

The Evil May Be Due to Any One of a Number of Reasons—How the Nuisance May Be Prevented

PERHAPS few problems in the earlier days of gas engine manufacture puzzled the designer more than cylinder cooling. This is, perhaps, not surprising when it is remembered that the earlier internal combustion engineers gained their professional knowledge in the steam engine school, where the object aimed at was the retention of heat by inclosing the cylinder in a jacket of exhaust steam, which naturally had the reverse effect to that desired in a gas engine.

Although various cooling systems have been brought to a high state of perfection, doubtless finality has not yet been reached, and it is very questionable whether the ordinary motor user—both master and servant—has given that attention which he should to the cause and effect of undue cylinder heating. It is an acknowledged fact that over-cooling is undesirable, but the cases when it occurs must form a very small percentage of the whole, as the natural cylinder surroundings and conditions all tend in the opposite direction.

It is, however, with the problem of overheating that we are dealing, and before diagnosing the causes we will first study the effects. The space occupied by gases of all kinds is determined by their temperature, and as vaporized petrol is no exception to the rule, this has a very important bearing when considering motor-driven vehicles. The cubical capacity of the cylinder, other things being equal, determines its horsepower; such space must be charged with the correct quantity of fuel, which in turn must receive the treatment that enables it to give the best results.

If the water circulating system is in any way defective the cylinder becomes overheated and the incoming charge expanded beyond its usual dimensions, so that a full quantity is not drawn into the confined area.

Other things invariably follow overheating, such as pre-ignition and want of compression, the lubrication is all upset, as an oil that may be an excellent anti-friction element when subjected to a certain heat naturally has its limit, and when this is exceeded, fusion takes place, the lubricating properties are lost, and, instead of the piston rings taking an easy sliding gas-tight travel up the cylinder sides, a grinding frictional movement follows. In this way more heat is generated, until perhaps seizure takes place, or, if events take another course, a broken connecting-rod or crankshaft may result.

The fact of a little steam escaping from the radiator is not a sure sign that there is anything materially the matter. This remark applies even with greater force in hot climates in summer time, or where continuous long runs have to be encountered with steep gradients.

Cheap oils are false economy; one should only use a lubricant that carries entire confidence. The writer had an instance recently with a car which when running slowly and using a low-grade oil showed loss of power, and, though a careful examination of the circulation and lubrication systems proved all was in order, the trouble still continued. The oil was tested and found to be quite good for low temperatures but almost valueless in high ones such as those met with in the class of engine we are considering, as almost the moment it entered the cylinder it was burnt up so that part of the piston traveled in unlubricated ground. Deposits of carbon are much more likely to accumulate under the adverse conditions named, and eventually the carbon becomes an incandescent substance, giving rise to what is known as pre-ignition. Whether this is taking place may be easily proved by switching off the spark; if pre-ignition is taking place the engine will continue to run so long as there is a vestige of life left in the carbon deposits referred to. As such action takes place before full compression has been reached, it will readily be understood that an engine running under these conditions is extravagant in fuel and wear, and weak as a tractive agent.

Having mentioned some of the evil effects of overheating we will pass on to the causes. **The choking up of the radiator and circulating pipes is a very common source of trouble. When such is the case much depends upon the water that has been used; if only dirty, washing out is all that will be necessary; if water of a hard and brackish nature is employed, the hotter it becomes the quicker the solids are deposited on the pipes and furring follows.** The writer was in charge of some engines and boilers where surface condensers were in use, and where a 9-inch pipe carried the water off from the condenser tanks. In less than 3 years the pipe was so clogged with a hard lime deposit that only a 2-inch stream of water could pass by. This is mentioned to bring home to motor users how important it is with the small-bore tubes at their disposal to take every precaution against sediment.

If a circulating pump is the medium for water circulation it is not an uncommon error to assume that so long as this part of the engine is working the water is moving along the prearranged lines. This is not necessarily so, as an air lock may have been set up. Nearly all radiators are fitted with a draw-off tap, and if trouble is suspected from the direction suggested this should be opened and the air released; when there is not a tap, it is better to break a joint than to allow the trouble to continue. **One frequently sees exhaust pipes that have been subjected to intense heat, and many users at once attach blame to a sooted-up silencer, and are much puzzled, when taking it down, to find such is not the case. As often as not the seat of trouble is in the water-circulating system or action.**

Improper driving will produce overheating, particularly in hilly districts, by hanging on to the third or fourth speeds when ascending inclines and so causing the engine to labor; the effect of such action is equivalent to overloading. Unduly-heated bearings or broken balls are active agents as friction producers, and bring about much the same result.

In dry weather any leakage from the radiator or connecting pipes is soon seen, but in wet, damp or foggy times it is not so apparent, and an insufficient water suply is much more readily produced from loss of water by leaking than boiling. A dirty car oftentimes shows a tendency to cause overheating troubles. This is not surprising, for there are few better non-conductors of heat—and, consequently, are excellent heat retainers—than road mud.

When an engine has been lying unused for some time rust will often accumulate in the cylinder jackets, and, being heavy, it falls to the bottom, collecting any other particles with it and forming into a solid mass, thus preventing the cooling element from getting to the lower portion of the exterior walls. Some, and even experienced users, recommend softening agencies that do not easily dissolve absolutely, but the writer strongly deprecates the introduction of any substance that does not form a saturated solution. **There is nothing better or cheaper than common washing soda, which has the advantage that it can be obtained at any village store. It is best to dissolve the soda in warm water before pouring it into the radiator, otherwise the crystals drop to the bottom and it may be some time before a proper solution is obtained.**

—From the *Motor-Car Journal*, September 28.

Part I Carburetion

Subject Digest

Carburetion is more or less perfect according to how air is mixed with the molecules of liquid fuel.

Fuel mixing may be accomplished in three ways—passing air through liquid fuel, spraying liquid fuel, and evaporation by applied heat.

Heat is required to convert a liquid fuel into a gas, and the amount of heat so needed is in proportion to the latent heat of the fuel.

The latent heat of gasoline is difficult to state, but it approaches 320 British Thermal Units per pound evaporated.

The temperature at which a mixture of gasoline and air will remain stable is important, and varies with the richness.

To obtain carburetion and maintain it with low temperatures it is necessary to either make the mixture abnormally rich or to carburet only with light fuels.

by Robert W. A. Brewer

BY the use of the word carburetion in the following article, it must be understood that this word will designate **the art of mechanically mixing or blending a liquid fuel with a certain amount of air, and that whether this art is carried out to the limits of perfection or not is an indication of whether the carburetion is good or bad, and carburetion will be considered to be more or less perfect according to how the air is mixed with the molecules of the liquid fuel and to whether the fuel is divided into its finest possible particles, and every particle of fuel is surrounded by a certain quantity of air to the limit of homogeneity of the mixture.**

Fuel may be mixed with air in at least two ways: The first and the oldest form of carburetion is by passing the air through a volume of liquid fuel; on the other hand, the volume of air can be treated by spraying into it a certain quantity of fuel in a more or less finely divided state.

There is still what might be another form of carburetion which is virtually distillation or evaporation by means of applied heat, and it is quite conceivable that if a volume of air is passed over a liquid, and a higher temperature than the normal is applied to this liquid, the evaporation of the liquid will be accelerated above what it is under ordinary atmospheric conditions, and assuming that the rate of evaporation of the fuel is in proportion to the amount of air passing, and that the air is brought sufficiently near to the surface of the fuel, a satisfactory form of carburetion will follow.

It is naturally somewhat difficult, when dealing either with air or with fuel in quantities, to obtain a homogeneous result in the mixture, and for this reason it is preferable to treat small quantities as desired. Furthermore, when small quantities of air and fuel are dealt with, there is not so much risk of any involuntary ignition of the explosive mixture in the generating chamber as is the case where a larger volume is dealt with in a chamber of considerable capacity.

An engine such as is used in the modern automobile is not running under constant demand, and therefore, it is preferable to create an explosive mixture in accordance with the demands of the motor, rather than to store up any quantity of explosive mixture to meet any sudden demand which may come upon the engine. In this practice we are more nearly approaching the modern trend in stationary gas-engine practice, where a suction producer is fitted, and the suction producer in that case corresponds to the carbureter of an engine, rather than to the gas holder which was previously used when coal gas was employed as the fuel for large stationary internal combustion engines. We find in a gas set, where the engine sucks directly upon the coal carbureter, the amount of carbureted air which is drawn in is in direct response to the demands of the engine.

Now it is very obvious from general principles obtaining in nature, where a body is converted from one state into another, that is either from a solid to a liquid state, or from a liquid to a gaseous state, **a certain amount of interchange of heat must take place in order to effect this change of state, and the amount of heat absorbed is,** of course, **in proportion to the latent heat of the body.**

In the case of a liquid such as gasoline, which is of a complex nature, one cannot exactly state what its latent heat of evaporation is, but it is of the order of 160 calories per kilogram, equal to 320 British Thermal Units per pound of fuel evaporated. **That means to say that every pound of gasoline which is passed through the carbureter requires an addition of heat equal to 320 British Thermal Units in order to evaporate it, so that the resulting mixture shall remain at the same temperature as the incoming air.**

This heat can, as we know, be applied in two ways, either by raising the temperature of the incoming air by drawing that air over, say the exhaust pipe, or by heating the induction pipe between the mixing chamber of the carbureter and the engine valves. **It does not really signify how the heat is added so long as the temperature of the resulting mixture remains as desired.**

Now by this latter expression, of course a great deal depends upon the locality and the duty which the car has to perform, and theoretically it is more suitable for the temperature of the incoming mixture to be as low as possible consistent with the liquid remaining in the evaporated or suspended state without precipitation. Supposing we predetermine what the final temperature of the incoming charge of carbureted air should be, it is a fairly simple matter to calculate what temperature the air should be which enters the carbureter inlet, knowing the specific heat of the air. If we take this figure as 0.259, which means to say that 1 pound of air heated through 1 degree Fahrenheit requires 0.259 British Thermal Unit, it will be obvious that in cooling this 1 pound of air through 1 degree Fahrenheit we abstract 0.259 Thermal Unit.

Taking for example a ratio of air to fuel, by weight, of 15, a final temperature of the mixture of 60 degrees Fahrenheit, we find that 15 pounds of air will give up 15 pounds $\times$ $0.259 = 3.9$ British Thermal Units per 1 degree fall of temperature. Now, as we mentioned, the latent heat of the evaporation of the fuel is 320 British Thermal Units, we find that the temperature drop, assuming that there is no other heat interchange, is $320 \div 3.9 = 82$ degrees Fahrenheit.

Now if we consider the temperatures at which mixtures of gasoline and air will remain stable, we find that for a correct mixture the minimum temperature is 3.6 degrees Centigrade, but if the mixture is enriched with 20 per cent. of fuel, the temperature can be reduced to practically 0 Centigrade, that is, 32 degrees Fahrenheit. The richer the mixture the lower the temperature, but we may take it that at the freezing point of water we have practically the limit at which a carbureter will work. **It is therefore obvious, if we have a drop of 82 degrees in the carbureting system, the temperature of the air must be at least 82 degrees Fahrenheit above the freezing point, in order to satisfactorily carburete the air without precipitation taking place.**

Next we come to the explanation of a fact which is not generally understood, that is, why it is that a fixed carbureter, or carbureter in which the relations between the air flow and the fuel flow are predetermined, does not always work well until it is warmed up, and that it is sometimes necessary to flood the carbureter before the engine will start. This is entirely due to the complex nature of the fuel and to the absence of sufficient heat supply to effect carburetion.

From the previous figures, in which it was pointed out carburetion would not remain stable unless the mixture was abnormally rich, it will be obvious that **in order to obtain carburetion and maintain it when the temperature is low, it is necessary to do one of two things, either to make the mixture abnormally rich or to ignore the heavier functions of the fuel and carburete only with the lighter ones, allowing the heavier ones in the first instance to be carried through the engine and consumed.**

It is often pointed out that the so-called automatic carbureters are difficult to start, and will not work until properly warmed, and that it is essential for their working that they be either water-jacketed or heat-jacketed in some way. This is perfectly true, as in a properly designed carbureter of that type the fuel is correctly proportioned for running under normal conditions, and at other times the air supply must be shut down or the fuel supply temporarily increased.

It may occur to the reader that there is one other way of adding heat to affect carburetion, that is, adding it to the liquid before it is mixed with the air; but on consideration it will be obvious that as the relative weight of liquid to air is small, of the order of 1 to 15, that although the specific heat of the liquid is very considerable as compared with that of air, it would be impossible to add sufficient heat to the liquid in order to supply the necessary thermal units required for the latent heat of evaporation.

The specific heat of the liquid is only about three times that of the air, and as there is about fifteen times as much air as fuel by weight it is quite obvious that it would be necessary to raise the temperature of the liquid to say five times the range that it is necessary when dealing with the air, and of course this is quite impossible as the lighter factions of the fuel begin to come off at a fairly low temperature. Some carbureters certainly do heat the liquid fuel, but not to the extent here indicated, and furthermore, it must always be borne in mind that in those types in which the fuel is heated, there is another effect, that is, that of altering the viscosity of the fuel so that a greater quantity passes through the same orifice under similar conditions than would be the case were the fuel used cold.

A hot-water jacket in a carbureter, in addition to heating the fuel, does, of course, heat the incoming air, but it has been found in modern practice that an extension of the hot-water jacket is really necessary and the jacket is, therefore, carried some distance along the induction pipe.

Change in Carbureter Adjustment Needed for Winter

PERHAPS the owner of an otherwise well-behaved car will be surprised to find that his motor has developed an appreciable miss seemingly overnight, when he starts to take it out on one of the cold, frosty mornings that have now become common throughout the more northerly states of our country. If he is motor wise he will know that the time has come when he must readjust his carbureter.

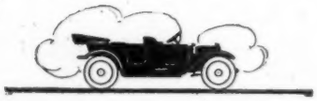
The reasons for this are many, and, after a moment's reflection, obvious. The assistance of a certain amount of heat is necessary in vaporizing the gasoline. In some motors this heat is applied by taking the air from a tube surrounding the exhaust pipe, while in others a hot water jacket is used for the same purpose as is explained in the above article. When the temperature of the outside air drops to a considerable extent the means provided for heating the air do not raise the temperature as far as is required by the carbureter adjustment that was satisfactory for summer. The air, being colder, does not evaporate the gasoline and as a result a misfire will develop.

There are two cures for this trouble. One is the taking of extra precautions to secure a warm supply of air and the other is to make a change in the carbureter adjustment. The first is that generally adopted by the carbureter makers who provide fittings to be attached to the carbureter when the cold weather sets in. The second method is the step that the owners of carbureters not having the hot-air attachment are compelled to take. **The adjustment consists simply in supplying a greater quantity of gasoline for a given weight of air.**

For the more progressive owners who desire to get away from the change of carbureter adjustment, which means the supplying of a richer mixture and hence a drop in the economy of the car, **the use of the dash control has been suggested.** In European practice and on many of the more expensive American cars this attachment has been fitted, although many have left it off with the idea of reducing complication. The driver with this attachment is able to take care of a climatic change without making any delicate needle valve adjustments. The dash control merely takes care of the amount of air supplied and does not interfere with the gasoline adjustments in the least. **When the misfire occurs in cold weather it is merely necessary to shut off the supply of air slightly and thereby allow the motor to draw in a richer charge.** After the motor has been run long enough to allow it to warm up the amount of air supplied in proportion to the charge can be increased.

With many carbureters, the problem is merely one of starting. After the motor has been running a few minutes there is no trouble whatever. Flooding the carbureter and priming are common means of starting in cold weather, as is also the shutting of the air passage, allowing the full suction of the motor to fall upon the spray nozzle. These should not fail with a motor that has been running well up to that time. With a cold and stiff motor, however, even priming will fail at times and the other methods produce no effect whatever. **In such instances five drops of ether to each cylinder of the motor have been found efficacious by many physicians and others who know of this method. Another trick that has been tried with success is the placing of about a tablespoonful of carbide in a small tin having a friction top.** A hole is then cut through the cover and the cover placed on the tin. Through the hole in the cover is run a small rubber tube or a piece of hose into the air intake of the carbureter. Through another opening in the tin is poured a half glass of water. After waiting for about a half minute the motor is cranked.

Roustabout and Coupé for 1912 Cole



Regular Runabout Model May Be Easily Converted Into a Closed Car for Winter

By George G. Mercer

THE individual owner of a model B 1912 Cole chassis with runabout body has little to fear of winter's sternness because he can, at a limited expense, have it converted into a winter roustabout or a coupé design, either transformation calling for practically no change, other than the positions of the gear-change and brake levers. The roustabout style, Fig. 5, can be had for $300 and the coupé body, Figs. 1 and 6, will approximate $1,000.

The roustabout is a most economical and novel method of transforming on open body into a winter one without adding any appreciable extra weight and giving a flexible type as the top can be lowered and the glass tops of the doors hidden, giving an open runabout with a stationary windshield. Such a body is ideal for the early spring and fall. It has an interior height of 38 inches from the cushion to the top bow. The coupé body, Fig. 6, seats two persons with space for one emergency seat and adds a load of approximately 450 pounds as compared with the open runabout.

The model B Cole chassis has a 122-inch wheelbase, four-cylinder motor with cylinders 4.5 inches square and wheels carrying 36 by 4-inch tires. Fig. 5 shows the roustabout body, consisting of the runabout body with a collapsible top, higher doors with upper glass halves and a stationary windshield.

All the conditions at the rear of the body remain unchanged. The coupé is roomier, because it is wider than the runabout and the doors are wider. The body design is similar to the old Sedan chair in appearance and is well adapted to carry out an altogether harmonious effect.

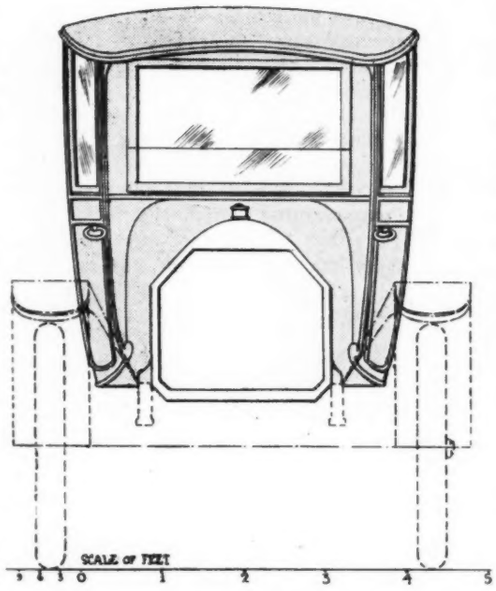


Fig. 1—Front view of Cole coupé design

Considering the two designs, the winter roustabout, Fig. 5, has been made by adding to the original body. In other words, Figs. 4 and 5 are identical up to the line where the new parts forming the top and glass front have been added, with one exception, namely, the location of the change gear and brake levers. In the original car, Fig. 4, these levers are located so that they are operated outside of the body, whereas in the roustabout body, the levers are brought farther in so as to permit of their being operated on the inside of the body. The Cole cars are made with the levers located for either inside or outside driving, hence it cannot be much of a problem to make the shift on an old car, the parts being manufactured and consequently readily accessible.

Having made the shift in the position of the levers, the car is now ready for the body changes. All the parts that are added to make the roustabout are intended to be fastened so that they can be removed in the spring and the original body attached.

The windshield is made with two uprights, fastened to the body posts at the front of the door. There are cross members at the top of the posts and across a line where the cowl intersects the front of the windshield framing. The cowl is fastened at the front to the cowl of the body and serves as a brace to the windshield. A divided glass is used with the upper part made to swing outward and serves as a storm visor.

The doors are of the regular type with a wood panel added to the top to make the sides higher. To the new top line of the door A, Fig. 5, a glass frame B is attached by hinges and when locked in the position illustrated, it forms an integral part of

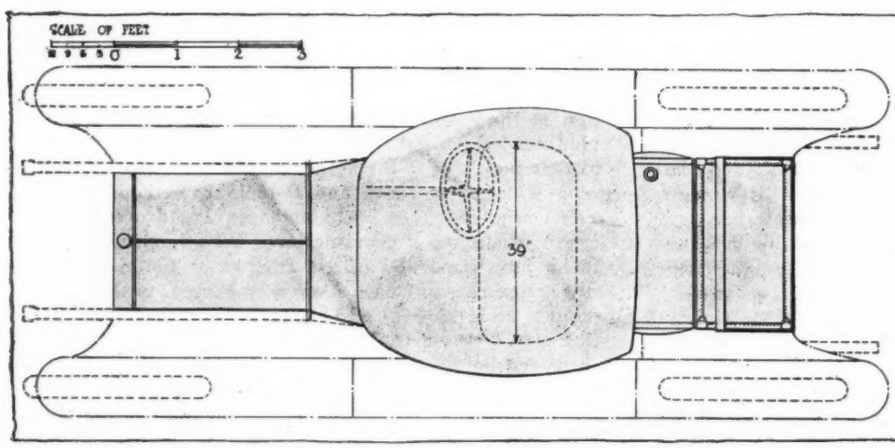


Fig. 2—Plan view of suggested coupé for 1912 Cole runabout chassis

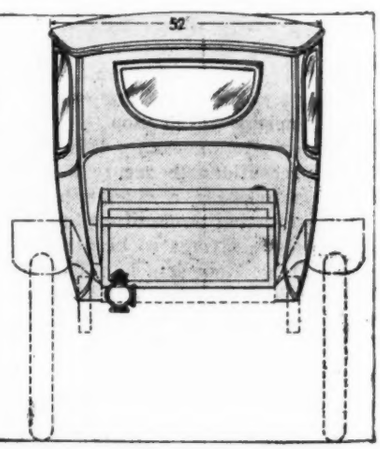


Fig. 3—Rear elevation of coupé

the door, when the latter is opened and closed. It fits against the door posts at the front and back and effectively shuts out the draft, and, with the top down, this glass frame is made to disappear by revolving on its hinges and lying flat against the inside of the door. Dotted lines B1 show the frame in this position.

A bow C extends from the body line on one side to the corresponding point on the other side, and is made wider to a height level with the top of the door glass frame. This is to provide a stop for the latter as well as to serve as a wind-break. The cut D is the point at which the top breaks when in the down position and the hinge is indicated on the back of the bow. The two rear bows travel with the bow C, but the horizontal bow E is lifted out of the connection F and fitted into F1. This bow E, when in the horizontal position and with the top raised, is fastened at the front end by a strap on each side to the windshield post. To make it an easier proposition to remove the top in the spring, a shifting rail is used, top irons being placed in the body to receive them. The lower edge of the top material is stitched to this rail and there is also a lug projecting on each side of the car to receive the lower end of the side joint.

The top material fastens to the back edge of the bow C by a metal molding extending from the bottom to the top of the door glass, or approximately up to F. On the bow E it is similarly fastened at the front, beginning from the windshield post. From this point back to F the material is loose from the bow and is reinforced and stitched forming a flap which covers the top edge of the door glass frame. This flap is lifted by the frame when the door opens.

The size of materials used to construct this top is so well understood by the trade that it would be superfluous to make mention in detail here. The bows are a standard commercial article, as are the joints. The shifting rail is made from .75- by .375-inch oval machine of C. R. steel and the cowl from aluminum sheet, No. 16 gauge. The wood frame of the door glass is heavier than usual at the bottom to give room for fastening the lockcatch. As the frame is unsupported by any framework other than itself above the door, a wider bearing is necessary.

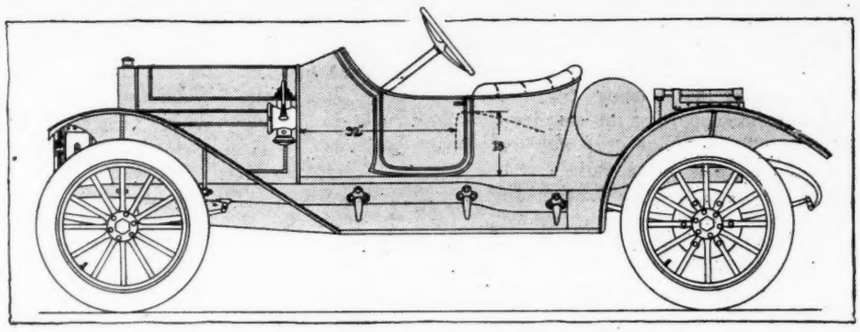


Fig. 4—Cole 1912 runabout type which may be adapted for either coupé or roustabout

The top material would preferably be English Burbank, a material with a heavy texture and well adapted to keep out the cold. To insure greater comfort, the top should be lined with light-weight broadcloth. One small celluloid window is placed each side between the two last bows and in the rear curtain a similar light of generous proportions is placed.

The cost of the changes from Fig. 4 to Fig. 5, but not including the change of the levers, will be approximately $300. This will cover specifications for the best English Burbank top material, a fair quality American broadcloth for inside top lining, the ironing of the pillars and the putting in of the new top iron supports, adding to the door height, making the door-glass frames and the front windshield and adjusting with suitable fastenings. Straps are used to keep the top steady when it is lowered and between the two last bows a small block or buffer is used to keep them apart, and thus protect the celluloid side light from being broken when the top is strapped down.

Fig. 6 illustrates a totally different way of providing for winter service with the Cole car. The plan is more elaborate and more expensive, and for the majority of people it will be proportionately more satisfactory, provided the winter service required will warrant the increased expenditure. The most satisfactory body to use for extremely cold weather is one with a permanent upper structure. Any form of collapsible top will deteriorate more rapidly than the former and the more numerous openings or joints indicate a greater likelihood of wind and rain forcing their way through.

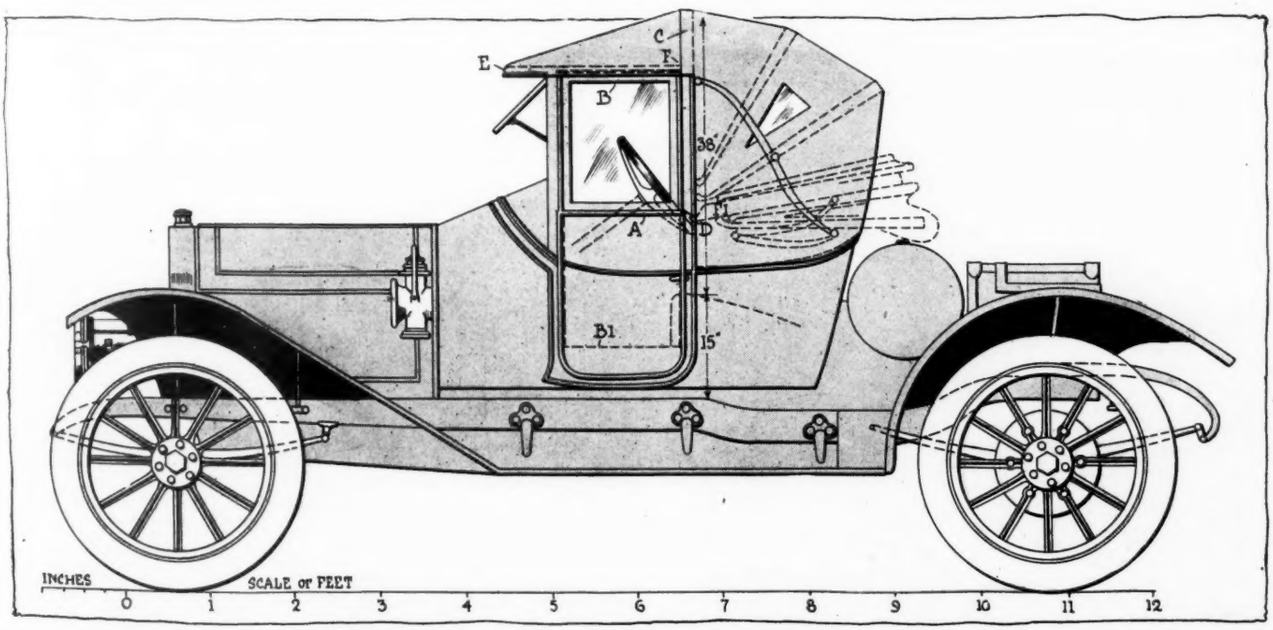


Fig. 5—Side elevation of suggested roustabout body suitable for 1912 Cole runabout chassis

The coupé body, Figs. 1, 2, 3 and 6, is fashioned from the old-time Sedan chair and for the purpose here used it seems extremely applicable. It has been installed in the same space on the chassis as that occupied by the runabout body, Fig. 4, and the platform supporting the gasoline tank and trunk remains undisturbed. The change gear and brake levers have been moved inside the body as in the roustabout.

The side elevation, Fig. 6, shows the dimensions from the dash to the front of the seat, and the height from the frame to the top of the seat cushion to be the same as in the regular body, Fig. 4. The depth of the cushion to the back, approximately 18 inches, gives 15 inches between the back and the steering wheel. The height above the cushion to under roof is 40 inches and the width of the cushion in the plan view, Fig. 2, is 39 inches. The seating capacity affords luxurious accommodation for two people, with space for one emergency seat.

Provision for extra tire carriers has not been installed, the idea in the mind of the designer being to retain the chassis intact as in Fig. 4, with the single exception of changing the levers. In the spring the coupé body can be removed and the former body substituted.

The doors are 23 inches wide over the moldings and as the seat cushions are rounded at the front corners, the change gear and brake levers have been placed in from the side so that the entrance through the right door is posssible.

One noticeable feature with a coupé that is not possessed by a collapsible body is the possibility of having plenty of window space. The windows have the regulation wood frame for the glass. The windows in the doors are made to drop their full length and those at the rear of the doors will drop three-quarters their length. The rear window is stationary. The front glass is divided, the upper part forming a storm visor.

The dash, integral with the body, permits of the body being taken off as a unit, not disturbing the old dash, which in turn is built into the cowl of the runabout body.

The specifications call for an all-metal panel body, the panels of 16-gauge aluminum. Metal moldings are used throughout except the heavy ones on the door and hinge pillars. These are of wood and are worked solid on the framing.

The interior dimensions should be as indicated in Fig. 6 and the width and length of the body outside to be as indicated on Figs. 3 and 6, respectively. The body should be made so as to occupy the same space on the chassis as that occupied by the former body, and without any alteration to the chassis other than the change in the location of the gear change and brake levers. The windows should be as previously described and the wood frames of same to be of American walnut in the natural finish. The body framing should be of good ash and the roof of laminated whitewood.

Specifications for colors bring out the question of good taste and durability. Consideration must also be given to the fact that next spring the coupé body will be removed and the runabout body substituted. Consequently it is wise to use a color for the chassis that will harmonize with either body design and so avoid having to repaint the chassis every time the bodies alternate. The present color is gray; therefore, it would be wise to retain the standard color for the under parts, and for the door and body lower panels of the coupé use a gray of the same shade or slightly darker. For the upper panels black will harmonize well, using black striping for the gray parts.

The body cowl and the short panel below the molding will match the chassis color. This color combination, besides being in good taste and advisable from an economical standpoint, is a combination that will wear well.

The trimming specifications will cover electric dome light in the roof and the suggestion for trimming material would be a combination gray and black Bedford cord of the best quality and trimming lace to match, this cloth to be used on the cushion, sides and back and roof; gray silk for curtains with tassels to match; Wilton carpet for the floor to be gray with small black flecks. Toilet case and card case should have silver mountings and should be covered with gray morocco. All metal parts in the interior to be silver or nickel finish, all visible wood parts to be black walnut finish.

The flat cost of a body, built according to the above specifications and finished according to same and mounted on the chassis ready to run, will be approximately $1,000 exclusive of the charge for changing the levers from outside to inside. The work of the designer is to a large extent suggestive. These two designs are suggestive possibilities and the car owner is the final link in the chain that leads from these possibilities. These designs are applicable to a number of different cars, and applicable to a greater or less extent, according as they are similar or dissimilar to the car used as a model. They are especially applicable, however, to Cole runabout bodies and have been designed with this end in view.

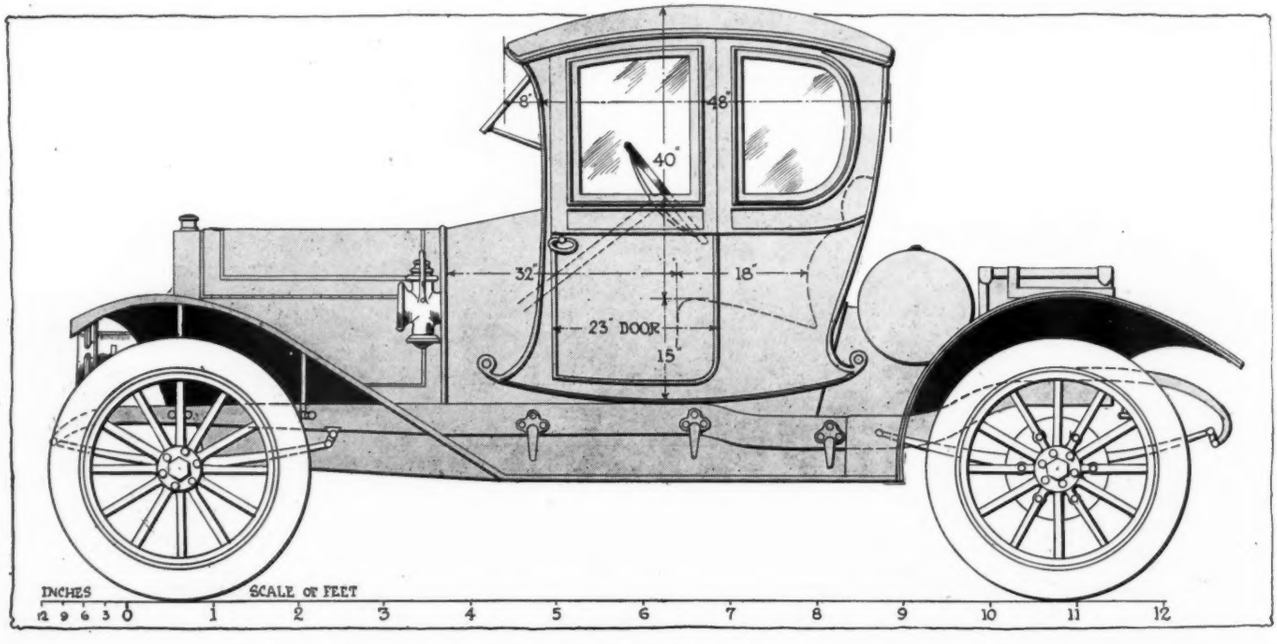


Fig. 6—Side elevation of coupé suggested for winter use on 1912 runabout frame

Good Materials Indispensable for Painter's Success

Red Lead Should Be Used Sparingly, as It Is a Heavy Pigment—Natural Oxide Paints Have Many Points in Their Favor, Especially Durability—Roughstuff, Like Paints, Should Be Very Pure

A READER of THE AUTOMOBILE writes to say that inasmuch as the black paints are coming to be largely used in structural metal painting, and are giving great satisfaction in this capacity, **why not use such pigments upon the metal automobile surface?** He cites the fact that lampblack will absorb 35 per cent. more oil than the light-colored pigments, and as oil is the life of the paint to a large extent, the **lampblack should be nearly unsurpassed as a first coater for the metal surface.**

There is no question concerning the durable properties of lampblack, but it is at the same time doubtful if this pigment will render as good service as red lead on the metal surface. Red lead and pure raw linseed oil, thoroughly mixed, as applied over new metal, either aluminum or sheet steel, will stick with great tenacity to the surface if applied rather thinly and well brushed out. The average mixture of red lead ready for application is 30 pounds of pigment to one gallon of oil. **Never mix red lead ahead of requirements. It is a very heavy pigment and settles quickly.** To retard the settling propensity of the lead, add to every 20 pounds of red lead 2 pounds asbestine pulp (magnesium silicate) and stir this mass into a gallon of linseed oil. Cut this mixture with a little turpentine to give it fluidity and permit only an expert brush hand to apply the pigment.

Natural oxide paints, that is to say, pigments having a mineral base, are likewise coming into favor as priming materials for new work. These oxides have good covering power and durability, and when prepared with plenty of good, raw linseed oil and let down a little with turpentine, they constitute excellent coatings at a saving of from 8 to 10 per cent. over the use of red lead.

The natural oxide paints here spoken of are composed in greater part of oxide of iron and in the family of reds they embrace Indian red, Venetian red, red oxide, etc. In connection with these oxide pigments red ochre, yellow ochre, umber, etc., owe their color to oxide of iron, but these ochres contain numerous other substances. **These pigments, under anything like reasonable conditions, are as nearly perfectly permanent as any pigment can possibly be.** They unite and mix well with all other pigments without in any way affecting them or being affected by them.

In laying coats of surfacing material directly over any of these red lead or natural oxide paints, the pigment used should be chosen with reference to its natural durability and its qualifications as a bodying up and surfacing material. **For this purpose white lead ground in linseed oil has long since demonstrated its value and usefulness.** White oil-ground keg lead is a soft, pliable, elastic, grain-filling and pore-sealing material when properly ground and prepared. Its remarkably soft, fine, elastic texture, unusual adhesiveness, exceptional surface filling and leveling-up properties, all unite in making lead a pigment of nation-wide importance in the automobile industry. And with reference to the use of this pigment the car owner or prospective has well-established reasons for insisting upon the use of a pure lead, or one approximately pure. **Moreover, he should insist upon high-class grinding and preparation of the lead.** A lead need not be chemically pure in order to establish its value and usefulness. But, above all things, it should be ground fine and washed free from foreign substances of every kind. With a lead ground as fine and smooth and soft of texture as good mills will grind it, first-class linseed oil being incorporated in its composition during the grinding, we have a surfacing pigment adapted to go immediately over the lead or other metal primer quite unsurpassed for the qualities which count for most in motor car paint shop work.

A couple of excellent coats of lead laid over the primer of oxide paint, red lead, or over any one of less known pigments, will suffice to give the surface sufficient body of pigment to support what is technically known as filler or roughstuff coats.

Into the roughstuff should go nothing but good materials. The day when scraps and drippings and left over material in general may be safely mixed into a paint, or into roughstuff particularly, has disappeared. The call is fairly, if not quite, universal for a surfacing material that will hold strong and fine upon the car and support to the maximum limit the coats of color and the foundation of varnish used over it. **It has been demonstrated that nothing short of the best paints, surfacing stock, colors and varnishes, will suffice to furnish service and good appearance.**

During the past two seasons the gray colors—automobile gray, French gray, battleship gray—have become exceedingly popular, and very properly so, for, above everything else, they have proved durable. The gray color, whatever its particular designation, is an easy keeper. **It is neutral in effect, shows usage and dirt less than almost any other color, and looks well.** There is one thing, however, to be guarded against in connection with the use of this family of pigments, namely, a tendency to streak out and disclose a glimmer of some one or more of the pigments entering into the composition of the gray. Only recently the writer had his attention called to a case of this streaking. It appears that a gray made up from a white lead base, this base being saturated with ultramarine blue and lampblack, developed dark streaks.

In the event of mixing these colors in large quantities and by a certain prescribed formula, as practiced by color manufacturers, a more intimate mixture is obtained, and the likelihood of the color washing out, streaking, and doing other freakish things, need not be considered seriously.

In previous issues of THE AUTOMOBILE allusion has been made to the practice of using colors ground in japan for automobile work. Such colors, thinned simply with turpentine, as generally advised by the manufacturer, are naturally brittle, and in this condition are ill-suited to the vibration and oscillation strains to which the car is exposed in road service. To overcome this property the use of raw linseed oil is urged. **For colors to be applied over an old paint foundation in itself somewhat brittle and parched, the pigment should carry at least one part pure raw linseed to every four or five parts turpentine.** For the second coat of color increase the quantity of turpentine to the extent of using nine parts of the thinner to one part of oil. Thus establish a safe measure of elasticity for the paint and color fabric.—M. C. HILLICK.

3-Point vs. 4-Point

Leading American Engineers Discuss the Relative Merits of Two Systems of Motor Suspension

Advantages and Disadvantages of Flexible and Rigid Motor and Gearbox Support Outlined

Part I

Eugene P. Batzell Analyzes Both Systems

Wm. G. Wall Is Against Three-Point System

Charles E. Duryea Favors Three-Point Scheme

Frank Nutt Wants Flexible Four-Point Support

DETROIT, MICH.—Editor THE AUTOMOBILE:—Hardly any doubt can be entertained that a correct engineering principle is embodied in such a suspension of the automobile motors, gearsets, etc., which maintains them free from distortion originated in the vehicle frame structure due to the unevenness of the ground, when the vehicle is either in motion or stationary. The theoretical three-point suspension similar as disclosed in the Huber patent, providing a swivel joint at one end of the suspended party, gives a good example of such a correct suspension, and it serves its intended purpose as well as can be desired in practice. Other kinds of so-called three-point suspensions have no swivel joint but depend on the flexibility of supporting bolts, arms, cross-members, etc., to give the necessary deflection at the third point of support. Though this suspension is not as perfect as the first, nevertheless it is used frequently, giving satisfaction in some cases and causing trouble in others.

In three-point suspension, apparently good results, in the matter of protecting the power plant from stresses due to the frame deflection, are obtained when equipping the supporting points with springs, etc., so that there is an elastic medium between the frame and the power plant. Not only will this construction relieve the power plant from the frame distortion but, as in heavy commercial cars with the front springs calculated to carry a considerable portion of the useful load and offering but little deflection for absorbing road shocks when the vehicle is running empty, the springs interposed between the power plant and the frame should be of great benefit for the life and condition of the former, inasmuch as they carry it, absorbing the road shocks in a manner practically independent of the vehicle load.

This kind of four-point, etc., suspension is less valuable for application to pleasure cars than it is for heavy commercial cars, because the former have a much more uniform load over their front springs, consequently here the rate of protection of the power plant from road shocks also remains more or less uniform and not influenced by the carried useful loads. Nevertheless, this suspension would fulfill the purpose of relieving the parts from the frame distortion in the pleasure cars as well as in the commercial cars. However, there are many constructive reasons why this suspension does not meet with popularity in application to pleasure cars of the existing type, there being fewer reasons against it in commercial car practice.

The supporting of motor transmissions, etc., on rigid subframes is apparently losing in the number of its followers. This suspension cannot entirely relieve the vital automobile drive parts from external frame stresses, though it modifies them considerably and helps to preserve a more or less true alignment between the parts. The first part of this statement can be easily proven by locating an assembled chassis on uneven ground so that the frame is somewhat distorted. Loosening of a motor leg fastenings almost always will leave a gap between this leg and the sub-frame member, which gap is not noticeable when the chassis is on level ground, provided it was properly assembled. The gap indicates that some of the main frame twist is transmitted to the motor crankcase through the sub-frame. The extent of harm which is apt to be caused by this twist can be judged by trying to crank the motor with the chassis on uneven ground once with one motor leg loose and then with this leg drawn tightly to the sub-frame. The motor leg in question should be the furthest from any of the sub-frame braces or supports.

Generally the crankcase of the motor is not stiff enough to prevent one from noticing, that a three or more bearing crankshaft is tighter in its bearings when the motor leg is fastened to the sub-frame. A big advantage of a sub-frame construction is often found in the easier locating and supporting of the different details like steering gear, pedal control, etc., especially when the car is to be assembled from ready bought parts.

The absolutely rigid suspension of the motor, etc., directly on the main frame no doubt presents disadvantages in the more noticeable effects of its distortion by the frame twist than is possible with any of the foregoing kinds of suspension, other conditions being equal. On the other hand, this rigid suspension on four or more points is often made to act as the frame cross members act, that is, assisting to preserve the relative location of the two main frame side members. Of course, this necessitates an extra strong construction of the motor legs and base, but it puts much added strength also into the front part of the main frame, which is generally the weakest part of the whole frame. With increased length of the motor and distance between its supporting legs, the successful construction of a rigid suspension becomes more difficult.

On the other hand, a frame combining great strength and flexibility permits a lighter rigid four-point suspension, which latter can be used here to great satisfaction. Extra rigid frame side members, like those in vogue in commercial cars, particularly frames of rolled channel sections, render a stiff four-point suspension very impractical, because the cases of the suspended parts have to be exceedingly strong. They must withstand the whole frame twist, as no deflection of the side members can be relied upon to partly relieve them from it. A flexible suspension similarly as mentioned before, when the mechanism parts are mounted on a sub-frame which is suspended on springs to the main frame, or when the parts proper are suspended on springs, offers a much better solution of a four-point suspension in the foregoing instance.

The sub-frame on springs or on pivots is best when in addition to other advantages it would help the alignment of parts mounted on it separately in succeeding order: motor-clutch, transmission-jackshaft, etc.

When only a few separate units of parts are used, like power plant, transmission and jackshaft, then their individual suspension on springs or on three points is just as satisfactory in functioning and somewhat simpler in construction than a flexible sub-frame for them.

The correct proportioning of parts and of the frame for a rigid four (or more) point suspension takes considerable study of the subject, which includes practical experimenting besides the mere theoretical figuring based on logical consideration of the matter. Of course, in any case, it is much less troublesome to adopt one of those suspensions, which will wholly or partially protect the vital parts of the vehicle mechanism from the frame distortion. This would decrease the chance for trouble on account of the suspension, but, on the other hand, the rigid bracing of the front part of the frame by a more or less short and stiff motor base construction may have its advantages. At any rate, the existance of a successful rigid four-point motor suspension speaks well for the engineer, who constructed and proportioned it.

The few advantages of a rigid four-point motor suspension cannot be perceived in a four-point suspension of gearsets, jackshafts, etc. These latter parts are better suspended in a different manner, which actually is being followed in practice with but few exceptions.—EUGENE P. BATZELL, Hudson Motor Car Company.

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Three-Point System's Disadvantages

INDIANAPOLIS, IND.—Editor THE AUTOMOBILE:—As to the respective advantages of the three-point versus four-point suspension for motors, gearsets, etc., on cars, it appears at first sight as if the argument was in favor of three-point and, theoretically, a great many things can be shown in its favor. I do not believe that these advantages, however, work out in practice, which, together with the disadvantages, makes it questionable as to the utility of this method of suspension.

The three-point arrangement eliminates to quite an extent the twisting due to outside influences, such as road inequalities, but not the shocks due to wheels hitting obstructions in road, and at the same time, by having only three points, considerable more strain is placed upon the material composing these parts, due to the lack of a sufficient number of supports. Also there is considerable strain due to the momentum of these parts, caused by quick stopping and starting and centrifugal force on corners. I do not believe in an absolutely rigid support, though even this has its advantages in preventing the giving of the frame to too great an extent. In other words, without injuring or throwing the motor or transmission bearings out of line, the cases of these parts which have to be rather rigid to hold bearings in line, lend a certain rigidity to the frame which is a great help to the body work, for a frame which twists very easily is very detrimental to the proper working of doors of body and also to the paint, and causes a squeaking noise which it is almost impossible to eliminate.

The National for several years past has used a method of suspending its motor and also transmission by which arms bolted on to these parts have rested in sockets attached to sides of frame and held to these sockets by horizontal bolts, so that there is a hinged action at the end of each of these arms, thus allowing for most of the movement of side members of frame without putting any great strain on the suspended parts, and at the same time lending quite an amount of rigidity to the frame lengthwise and crosswise.

In regard to the Huber patent, while it is of considerable interest, I believe it does not concern a great many manufacturers, as the sub-frame has gone out of use to a great extent and the three-point suspension of sub-frame has been used very little.

Of course, it is up to the courts to decide whether a combination engine and transmission built in one consists of a sub-frame in itself. If this should be decided to be the case, there are a certain number of manufacturers of cars who would be affected by this patent.

I do not see any great advantage of this method of suspension, as it is not practical to make it rigid enough to do away with the flexible coupling between engine and transmission unless it is built into the castings of these parts, in which case it has the objections just mentioned of the three-point suspension. —WILLIAM G. WALL, National Motor Vehicle Company.

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Cites Three-Point Merits

SAGINAW, MICH.—Editor THE AUTOMOBILE:—Regarding the subject of three-point or four-point suspension for motors and other parts in automobiles, I have but little to say. The thing seems so one-sided that no discussion is possible. As early as 1896 I wasted good time trying to convince mechanical engineers that an automobile must be flexible enough to meet road conditions, and that mounting the various units of machinery on a rigid frame was wholly out of the question. Later I tried to persuade the people that American bad roads required three-wheeled vehicles, because even though one does get mechanism mounted for long life, the body of the vehicle and the passengers will properly suffer more or less, unless they also are three-point supported. For a number of years I built vehicles which were identical, except as to their front wheels, and I have had people especially anxious to secure easy riding try alternately one and the other, and decide in favor of the three-wheeler. I am sure that their decision is right. I can supply from my files testimony showing the durability of carriage bodies of three-wheelers, which, being free from the twisting strains of the four-wheeler do not open at the joints in time.

So far as the mechanism itself is concerned, modern practice breaks this up into separate units, which are usually more or less flexibly connected, and which units are quite often three-point supported, or if more than three-point supported, these supporting points are quite close together. My own practice consists of a three-point frame having the two rear wheels as two points, and a ball-and-socket near the center of the vehicle as the third. Such a frame can get over all kinds of rough roads without being twisted, but on this frame I mount another three-point frame which is the whole power plant, and I can only say that it is the most successful arrangement I have ever tried. It permits delivering out to the wheels a larger proportion of the motive power than any other arrangements I have ever found. I employed this three-point frame as early as 1892, but other considerations caused me to cease using it for some years.

It will interest your readers to know that this double three-point suspension also is arranged to be separated by sliding apart so that the inner frame carrying the power plant can be dropped out of the outer one in about 5 minutes' time. Such accessibility has never been seen in a motor vehicle, and is the solution of the repair bill problem.—CHARLES E. DURYEA, Duryea Motor Company.

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Three-Point Creates Vibration

KOKOMO, IND.—Editor THE AUTOMOBILE:—In reference to three-point suspension, this construction looks ideal in several ways, but the biggest objection to it that I have is that it seems to bring out motor vibration very noticeably, due to the torque action of the motor, while with the rigid four-point suspension the torque action is very well taken care of, although the twist of the frame is no doubt very hard on the crankcase and motor bearings. We use what is called the flexible four-point support, which, I think, eliminates the objection of both the flexible three-point and the rigid four-point.—FRANK NUTT, Haynes Automobile Company.

(To be continued)

Foreign Constructions Designs and Practices

Features of French Truck Design—Steel Bands Replace Rubber Tires—Lubricating the Spring Bolts

Novel Spring Shackle—German Device for Tight Clips—Engineering Observations from Europe

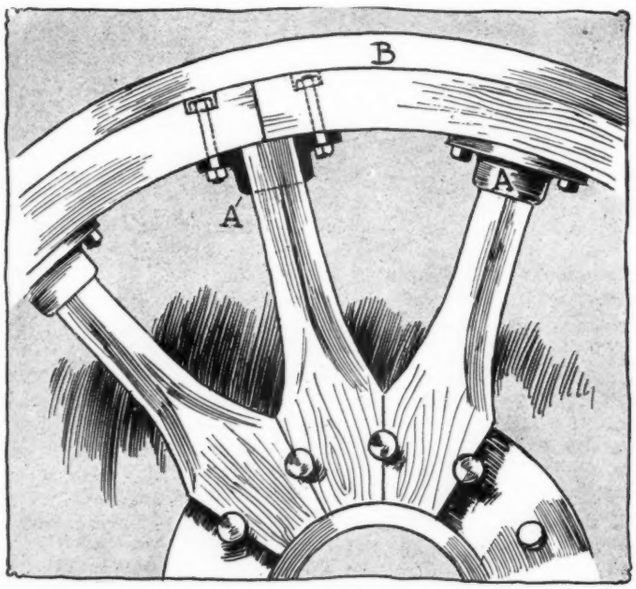


Fig. 1—Section of truck wheel fitted with solid steel band instead of rubber tire, the band measuring 8 inches wide and 1.75 inches thick. The hub takes plain bearings

OBSERVATION tells that a large number of the thoughts which have found lodgment in automobile construction work were borrowed from other arts. But experience has proven that the plagiarists were not always skilled in the art of transplanting. As a rule the simple contrivances of other arts were improved out of recognition and they were rendered so complex in the process that their actual value for the newer purpose became a question; **at all events, so far as Europe is concerned, a decided attempt is being made in the direction of simplifying mechanisms for automobile use.** That some mistakes are being made it is believed, but the field is so broad and the need so urgent that these steps are being taken as a necessity.

As an indication of just what is being done along this line take road wheels for motor trucks, which are being fitted with quills to the exclusion of ball-bearings. The quills are long—about 14 inches—and means for retaining grease, serving also to exclude dirt, are being provided. On a truck seen on the street of Vienna, Austria, the felloe was attached to the spokes as in Fig. 1. The steel band B, shrunk over the felloes, served in place of solid rubber tires, the latter being excluded from use. In this example of wheel work th spokes are about half the width of the felloe and the fastening to the spokes to the felloe, both of wood, is done by means of a metal accommodation piece A and bolts secured by radial bolts through the felloes.

Fig. 2 is of a truck spring, showing the method of fastening the shackle. This is common practice in German railway locomotive spring work and on some of the West Shore equipment. The point is that this railway idea is being used to a limited extent in truck construction in Europe.

Spring shackle bolts are now being supplied with grease cups with means for forcing the grease to the spring-eye bearing. This practice is quite general in Europe. Considerable trouble is being experienced in truck work, however. It seems to be extremely difficult to get the grease to pass out through the holes. Fig. 3 shows, in section, one of these bolts. It will be seen that, if the bushing rotates, it will cover the holes, where appearance, as on a truck, may not be the first consideration.

Lubricating the Spring Bolt

Fig. 4 offers relief from the trouble complained of as above referred to. The pin B should be of cementing steel, case hardened and ground to size. The idea is to get a good bearing surface for the bushings and great strength of the pin. The bushings E should have thin walls; 1-16 inch thickness of walls is enough. The heads on the bushings serve the dual purpose of providing a spacer as a washer and preventing the bushings from working endwise. Oil grooves or grease channels should be made in the bushings for one-half the distance out from the center. The shackles S should be drop-forged steel with a carbon content between 20 and 25 points, but the sulphur and phosphorus constituents should be under 0.03 per cent. on account of the nature of the work. To anneal the shackles after forging is a necessity also.

In freight automobile work, to use a trailer is frequently considered an advantage, but the average truck is not designed to accept a drawbar pull. Quite a number of trailers are to be seen in service in Europe, especially in Germany and Austria. It is worthy of note that provision is made in each of these cases for the drawbar pull of the trailer, the idea being to save the tractor from the consequences of a longitudinal as well as a vertical load. There are several detailed methods of accomplishing the end. In Fig. 5 the principle is shown. The pull comes on the rear axle at two points close to the wheels, but a spring bumper member is interposed in order not to impart too much of the shock of starting to the rear axle.

Drawbar Design for Trailer

Referring to Fig. 5, showing the axle X cut away at the center for purposes of clearness, the backarm A takes its support at two points between the spring perches and the road wheels—the space usually given up exclusively to distance or radius rods. The drawbar B has a bearing in this backarm and a second bearing in the inner support C, as it is called. The buffer spring S presses against the backarm and puts thrust upon the drawbar in the forward direction

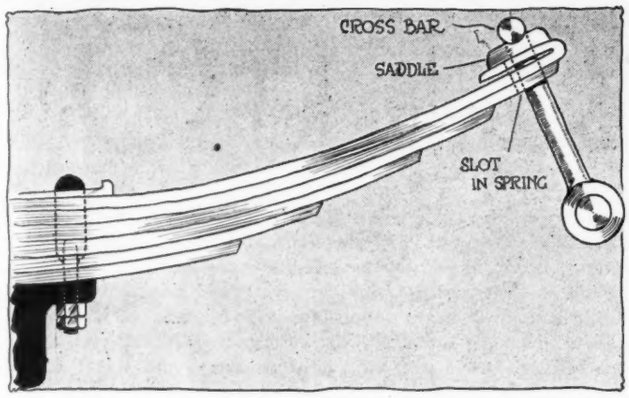


Fig. 2—European spring suspension for trucks, which has its origin in locomotive practice, and which is again in favor with truck makers

through an integral collar on the drawbar. A second stout spring S1, with a few coils, fills the space on the drawbar between the collar and the inner support. The drawbar passes under the axle. When the drawbar pull of the trailer comes on, it compresses the buffer spring until the pull is overcome. If the trailer overhauls the tractor the reaction spring S1 takes the load. Proper clearance of the drawbar must be allowed at all points. The tongue of the trailer is shackled at the universal joint and should have its weight supported at the trailer. The details of the radius-rod connections to the axle would have to be worked out with the details of the backarm. There is very little room to spare on the back axle of a truck, and this fact will influence the design.

German Wedge Spring Clip Tightener

Spring making in Germany is reduced to the level of a fine art. Good material for springs is regarded as necessary to entire success. But if the springs are not properly clamped to the perch, it is more than a superstition here that good material, excellence of workmanship of the spring maker, and proper proportioning of the springs will do very little good. It is said of springs that, unless they are firmly clamped to the perch, they will fail in exacting service.

The German Railway Engineers, having much experience with springs, clamp them somewhat after the fashion illustrated in Fig. 6. Some of the advanced automobile engineers are following along these lines also. Between the axle and spring are three members: First, a box A resting on the axle as secured thereto by a center bolt passing through the axle vertically; second, a plate with a curved contour bearing against the bottom leaf of the spring, and, third, a wedge or way between these two parts, so designed that by tapping with a hammer the fit of the spring within its clips can be tightened and held at any tension by the set screw C.

The above points are of special interest in view of the trouble that has been found in some of the American cars from breaking springs due to the condition that the spring pad did not have the same curvature as the spring. The fact that the curved spring rested upon the flat pad gave rise to the situation that a mere line contact was obtained in place of the flat seat. It is impossible to keep the clips tight where such a condition exists and, as a result, the springs work the clips loose and at the first heavy rebound they break. Some makers have placed a fiber block curved to the shape of the spring beneath the lower leaf and have obviated the difficulty in this way. Spring clips are especially apt to come loose in new cars.

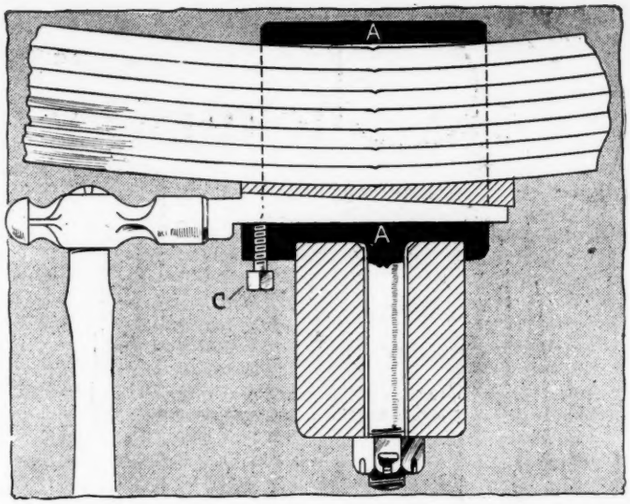


Fig. 6—German method of using wedge to insure tight spring clips, which is considered essential to good spring action and endurance

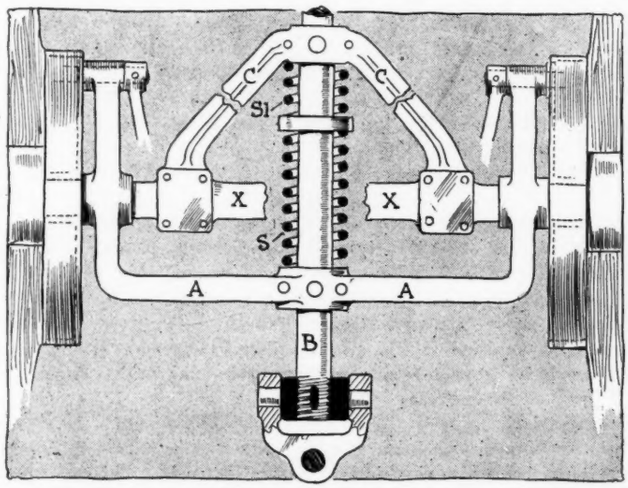


Fig. 5—Diagram of device for tractor-trailer use, showing the principle of taking care of drawbar pull of the trailer. Parts are: Axle X; drawbar B; buffer spring S; reactive spring SI; backarm A; inner support C

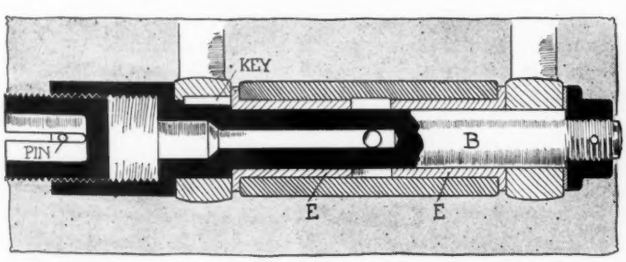


Fig. 4—New European form of spring shackle for motor trucks, showing two bushings E with clearance space for grease between their opposite ends, also means for using a long, powerful screwdriver to place the necessary pressure on the grease

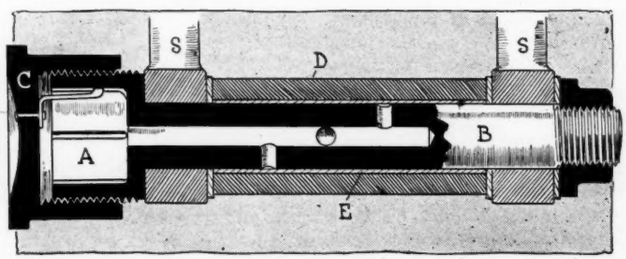
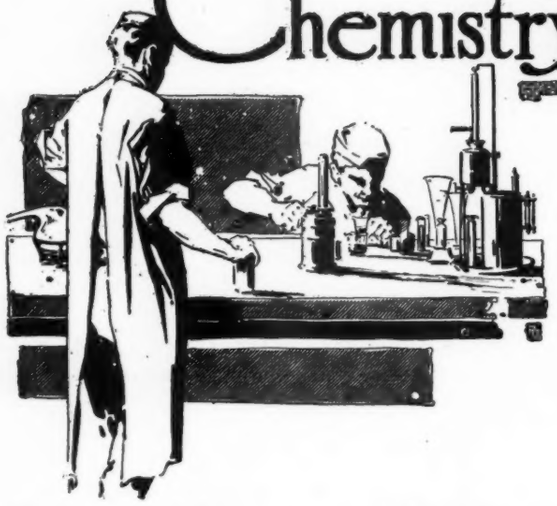


Fig. 3—Section of spring bolt for motor truck in which bolt B has a grease-cup head with screw cover and means for locking. The grease flows through the central channel and through holes H to the thin bronze bushing E in the spring eye D

The Chemistry of Cylinder Oils



Resinous Elements in Oil Give Acid Reaction Tending to Corrode Iron Surfaces in Contact

Part III

Being the third of a series of articles on cylinder oils which will appear from week to week. Discussions are invited and the columns of THE AUTOMOBILE *are open to pertinent criticisms.*

By W. Jones

ONCE more referring to the list of twenty analyses of oils, which we again publish in extended form (Table A1), showing the viscosities at high temperatures already mentioned, and also the acidity of the oils, their corrosive action on the metal of the cylinder, and the percentage of sulphuric acid in the three oils in which it was found.

We will first call attention to the acids in the oils. **We find in these oils two classes of acids: First, we have an organic acid, which is produced from the oil itself; and second, we have the mineral, sulphuric acid, which has been added in the refining of the oil, and has not been wholly removed.**

The organic acids in the oils can be, and probably are, produced from the oxidation of the oil itself. This we have found to be the case even with the kerosene oil which is sometimes used in steam boilers for the purpose of softening the scale. In the heat of the steam, which is above 300 degrees Fahrenheit, the oil is readily oxidized to an acid resinous substance, which we can obtain from the water of the boiler. We can also produce this action by other means in the laboratory.

In a publication of the Bureau of Standards it is shown that pure mineral oil, under certain conditions, such as raising the temperature for 5 hours to 250 degrees Fahrenheit, or by exposure to the action of sunlight and air for about 30 days, is readily oxidized to a substance insoluble in petroleum ether, but it is not stated what the nature of this substance is, other than that it is melted at a heat above 95 degrees Centigrade. This would indicate that it is the same resinous substance that we have obtained and that we find has not only an acid reaction, but has a corrosive effect upon iron. We consider that it is this substance that gives the acid reaction to the oil when sulphuric acid is not present, and that this substance has the effect of corroding, to a slight extent, the inside of the cylinder.

The amount of iron taken up by these acids, as shown in Table A1, must be more or less approximate, as it is very difficult to keep a circulation in the oil without continued heating, especially if the oil is at all thick, and this heating is likely to produce the acid effect if continued any length of time. Therefore, the only use of determining the amount of iron corroded is to show that **the acidity of the oil does have this effect upon the iron, and that oils of low acidity would be preferable.**

We now come to the sulphuric acid, present in three of the oils under consideration: This, we think, is much more important, as it will be noticed that the amount of iron corroded is much more in each case. However, this sulphuric acid may, and undoubtedly does, exist in two forms, free and combined. We have in No. 1911b enough sulphuric acid to show an acidity of .0324 per cent, regardless of any acidity due to the oxidized oil, while the total acidity in the oil is only .01029, one-half of which is probably due to the oxidized oil, leaving only the balance due to free sulphuric acid. The excess of sulphuric acid beyond this figure must be considered combined, most likely, as sulphate of soda that has not been entirely washed out. This sulphate of soda should have no effect upon the metal of the cylinder. This is borne out further by the fact that if this acid were all in the free state, and capable of acting upon metal, we would find the oil to take up very much more iron than it has in either of the cases presented.

In taking up the flash and fire points, we notice the close relationship between these figures and the viscosity, and that, as a rule, **the higher the viscosity, the higher is the fire point.**

We do not, however, consider that these figures have any great bearing upon the value of an oil for use in the gas engine cylinder, however much it may be desired to have a high fire test for other purposes. The oil No. 1867 with a fire test of 358 degrees Fahrenheit seems fully as satisfactory as those having a fire test of 500 degrees Fahrenheit, and when we consider the high temperature of the cylinder, which is far above the burning point of any of these oils, and that any of these oils will be more or less burned, and would be practically all burned if there was air enough in the cylinder for their combustion, we cannot imagine any difference as far as the lubrication is concerned. But when we come to think of the products of combustion, or what we might better say, the partial combustion of these oils, we would consider that the heavier oils, those of a high fire point, would be somewhat more difficult to burn, and in the excessive heat these heavy oils would, to a certain extent, be decomposed into a lighter and more easily vaporized oil and solid carbon, and that this is the source of the carbon deposit in the cylinder, although a large part of it is carried away in the exhaust as smoke.

We have seen the statement that the whiter the oil is the less carbon it contains, and that the only way to get rid of this carbon in the oil is by very careful filtration. By this one would think that the oil contained the carbon in suspension in fine particles, which could be taken out by filtering. This, of course, is not the case. **The carbon deposited in the cylinder is not from suspended carbon in the oil, but from carbon produced from the decomposition of the oil by**

the heat of the cylinder. The lighter products are consumed, while solid carbon is deposited on the cooler parts of the metal. For this reason we notice that those oils which contain the most carbon, not in suspension, but in their chemical constitution, or those more easily decomposed by heat, give more carbon under the same conditions favoring decomposition, and this is the carbon that gives the trouble in the cylinder.

To determine the amount of carbon any oil will produce in the cylinder would not be possible, for many reasons; but by adopting conditions as nearly like the engine as can be had in the laboratory, and maintaining the same conditions for each oil, we can very readily determine the relative value of the different oils tested.

We have now taken up each item in the analysis, and have shown its bearing upon the value of the oil for lubrication in the gas engine cylinder. We have yet to examine these different brands of oil, obtained from different sources, so as to be able to show what variation we may expect in oils of the same brand, if any; also if it would be safe to purchase oil by the brand name, or if it would be better to purchase on a specification as to what the oil shall show by analysis. This we expect to do in our next article.

—

Old Oil Must Be Drained Off

Just about this time of the year the automobilist is seriously thinking over the problem of whether he shall keep his car in commission all winter or whether he shall put it in dead storage until a more favorable season for motoring shall again come around. **For those who have decided to keep their cars running it would be well for them to clean out the oiling system if this has not been done during the summer season.**

On cars that use a circulating oiling system this is especially important as it will not suffice to simply renew the oil that is burnt up or that leaks away. The old oil that gathers in the bottom of the crankcase will become waxy and dirty. It will lose the very features which render it desirable as a cylinder oil and will cause trouble by gumming up the piston rings and carbonizing. If the course of the oil that is led through a circulating system be followed it will readily be seen by the most inexperienced amateur that this cleaning out is a necessity and that its omission will entail undesirable consequences.

Take the average splash system that is used to a large degree upon the average priced American car. The oil supply is carried in a reservoir which forms the lower part of the crankcase casting. From this reservoir a copper tube or lead takes the oil to the suction side of a gear or plunger pump. This pump in most of the splash systems does not take the oil to any special bearing but allows it to flow into the crankcase. When it reaches this it is picked up by spoons on the bottoms of the rapidly revolving connecting rods and thrown up into the cylinders and over the other bearings within the crankcase. Where the leads from the oil pump go to some of the bearings the method is generally the same. After the oil leaves the bearing it flows into the splash troughs and is picked up by the bottom of the connecting rods in the same manner. After this oil has been used for lubricating the moving parts of the motor it drains to the bottom of the crankcase and is again mingled with the fresh oil in the reservoir. Before flowing again to the pump, the oil is passed through a fine wire mesh screen which is supposed to rid it of all the harmful impurities it may have picked up on its former course through the system.

After a time the oil becomes so impure that the addition of the fresh oil has little cleansing effect and the motor starts to become fouled. Long before this time has arrived the careful automobilist will have drained out every bit of oil in the crankcase and poured in a gallon of kerosene after closing the drain plugs. After the kerosene has remained in the crankcase overnight, start the motor and allow it to run for about 30 seconds. Drain out the kerosene and refill with fresh oil.

It is important to see if the screen through which the oil passes from the crankcase to the suction side of the motor is clean. If this should become clogged the supply of oil to the pump will be very seriously diminished and the supply to the splash troughs will not be as great as it should and as a result all the troubles that can accrue from an insufficient supply of lubricant will threaten the motor. Cleaning the oil supply every 1,000 miles is not by any means too much although it is sufficient to clean the screens, etc., once a season. There are many who neglect the renewal of the oil supply for such a length of time that the whole motor becomes worn much more rapidly than would otherwise be the case simply because there is not as much oil reaching the bearings as should be the case.

With force feed oiling systems where the oil does not recirculate an occasional inspection of the speed at which the oil is passing through the sight feed should be made as this is an indicator of the well being of the entire system. There the oil box is carried on the side of the motor and the feed is drop by drop down an independent lead to each bearing, it is not necessary to renew the entire supply but it is important that the sight feeds indicate that the oil is being fed continuously to the motor bearings.

TABLE A1—ANALYSES OF AUTOMOBILE CYLINDER OILS—BY W. JONES

No.	Specific Gravity	Specific Viscosity at 80° F.	Specific Viscosity at 212° F.	Carbon per cent	Flash Point °F.	Fire Point °F.	Specific Viscosity at 350°F.	Acidity	Mgs. Iron Loss per 100cc Oil	Sulphuric Acid%
1867.....	0.8684	1.7647	1.1428	0.30	325	358	1.0357	.00294	0	0
1868.....	0.8984	3.2353	1.3214	0.70	384	432	.....	.00441	2.66	0
1869.....	0.8992	4.1764	1.3571	0.75	404	460	.....	.00588	2.00	0
1870.....	0.8948	6.1764	1.4285	1.03	422	474	1.0357	.00490	1.33	0
1890/a.....	0.8755	5.7657	1.4285	0.80	458	504	.....	.....	0	0
1890/b.....	0.8651	3.8571	1.3035	0.72	448	510	.....	.....	1.33	0
1894/a.....	0.8985	3.5714	1.2857	0.95	408	454	.....	.....	1.33	0
1894/b.....	0.9103	4.4643	1.2500	1.70	428	474	.....	.....	2.00	0
1896/a.....	0.8860	2.2500	1.3214	0.65	420	476	.....	.00249	0	0
1896/b.....	0.8866	3.6428	1.2500	1.00	424	476	.....	.....	0	0
1896/c.....	0.8868	4.6071	1.4285	1.10	428	478	.....	.....	2.66	0
1896/d.....	0.8874	6.3214	1.4285	1.10	428	490	.....	.....	2.66	0
1896/e.....	0.8976	18.6071	2.0000	2.35	454	526	*1.1071	.00441	0	0
1897.....	0.8747	3.8571	1.4285	0.44	438	494	.....	.00294	0	0
1914/a.....	0.8953	5.1428	1.2857	0.52	412	464	.....	.....	1.33	0
1914/b.....	0.8756	4.1085	1.3571	0.70	434	490	.....	.01029	3.33	.0324
1914/c.....	0.8801	7.5353	1.5357	0.93	450	506	.....	.....	3.33	.0223
1934.....	0.8705	3.3928	1.2143	0.55	440	494	.....	.....	0	0
1935.....	0.8777	3.5714	1.2500	0.78	438	486	.....	.....	0	0
1936.....	0.8738	3.5714	1.2500	0.53	442	494	.....	.01225	4.00	.0286

*At 400° F., 1.0714; at 500° F., 1.0357.

Curing Faulty Lubrication of Steering Knuckle; Metal Enameling Described; Tip on Adjusting the Schebler; How to Eliminate Rattles; View of Automobilist on Left Drive; Mounting Ball Thrust; Dangers of Using Alcohol Solution

Steering Knuckle Squeaks

EDITOR THE AUTOMOBILE:—The steering knuckle on my car is oiled by a small oiler placed on top. I do not think that the knuckle gets sufficient lubrication as I have traced a squeak which proved troublesome for a long time to the knuckle. The squeak seems to be at the bottom of the knuckle I have used a considerably heavier oil, thinking that if I could get a lubricant with a little more body it would stay in place and would cure the trouble. The improvement was marked, but at the same time the squeak is still there to some extent. How would THE AUTOMOBILE suggest making a permanent cure?

Chicago, Ill. TROUBLED.

—If the trouble is where you state it could no doubt be remedied by fitting a grease cup at the point noted in Fig. 5. The pin should be removed and grooved at the bottom slightly to allow the grease to work its way down into the bottom bearing. A small grease cup should then be purchased and a hole drilled through the spindle of the same size as the opening in the grease cup. As cups of different sizes are sold throughout the country it is best to take this measurement from the cup rather than to give the standard diameter of drill. The hole is then counterbored for a sufficient depth to take the threads on the grease cup. After counterboring to the proper depth, the hole should be tapped and the grease cup can be fitted in place. When the grease cup has been located on the spindle fill it with grease and turn it down as far as it will go, refill and turn down three revolutions. After this a turn before each day's run will be enough.

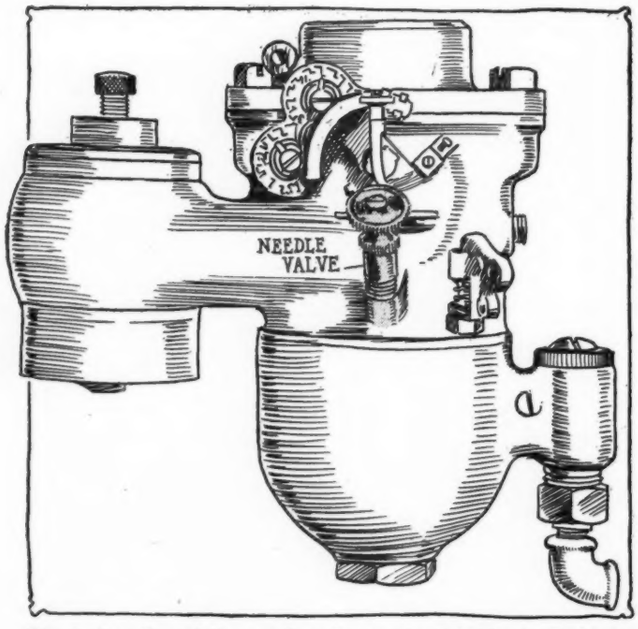


Fig. 1—Location of the needle valve on the Schebler L, Carbureter

Method of Enameling Metal

Editor THE AUTOMOBILE:—Will you please give me detailed information of the most up-to-date methods used for enameling metal? Also please give the formula for finishing metal in aluminum.

Philadelphia, Pa. J. H. ROHRER.

—The processes of metal enameling which are now in vogue vary exceedingly. This variation is not only due to the fact that the enamel which is designed to resist one condition is not satisfactory for another, but is also due to the various methods

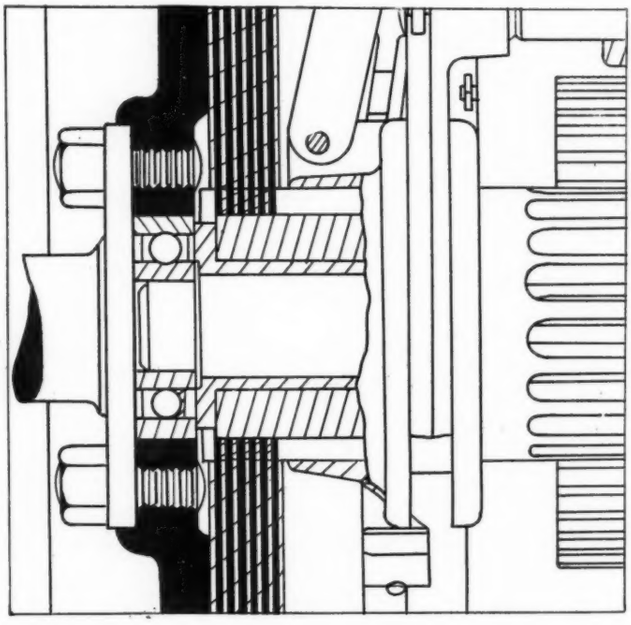


Fig. 2—Where the ball thrust is placed on a multiple disk clutch

which are in use in different shops. An up-to-date method which is satisfactory for use on the motor body and especially on the hood and such parts that are exposed to the heat is as follows:

The part that is to be enameled is first made free of dust and grease. This is so important that it must be done in the most particular manner. The part to be enameled is then prepared for the enamel. The enamel or japan can usually be secured at any local store and will generally be accompanied by a set of outlined directions which will contain the proper temperature that the enamel is calculated to withstand. Parts such as automobile frames are first rubbed with a rag saturated in spirits of tar until the entire surface is covered and are then placed in an oven at a temperature of 380 degrees Fahrenheit for about 20 minutes. They are then ready to receive the enamel. Larger parts can be

rubbed down smooth with emery. This is a tedious operation by hand and any one who is going to do any extensive work should seriously consider the purchase of a special polishing bob. The finishing work is done with pumice or by a cloth and leather polishing bob. The surface is not ready to receive the enamel until it is perfectly smooth. After the japan or enamel is applied to the surface it is heated to a temperature of 290 degrees Fahrenheit for black and about 150 degrees for the lighter colors. The oven in which the heating is carried on should be lined with fire clay as brick gives off gases which absolutely prevent the securing of good results. When the enamel is heated the volatile base is first driven off. This generally consists of turpentine or methylated spirit. After the base has been driven off

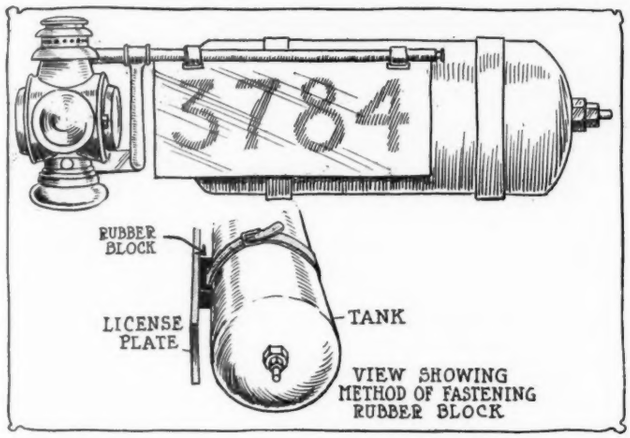


Fig. 3—License plate sometimes strikes acetylene tank. Cure shown

there is a gummy residue remaining. As the temperature is allowed to subside after the heating has been carried on for 1 1-2 hours, this coat will harden. After standing two days another coat may be applied. The third and last coat is a special finishing japan which is designed to provide a polish and is therefore made up largely of varnish. It is applied in the same manner as the previous coats. This is the general method used in the smaller enameling jobs. The details will vary slightly according to the part to be japanned, but if this plan is followed through a finished job can be turned out from the raw material in five or six days without trouble.

Aluminum finish for metals can be applied very satisfactorily by the use of any of the higher priced grades of aluminum paint on the market. These are applied according to the directions to be found on the can and will hold their color for a considerable length of time. When they start to wear off, they can be replaced by the addition of another coat.

Eliminating Noisy Rattles

Editor THE AUTOMOBILE:—While out in a friend's car recently we commenced to talk about the noises which are made by the average car. We were traveling along a road that could not be called bad, although not as smooth as it might have been. After a general discussion on the subject we commenced to listen to determine if we could diagnose the sounds that issued from different parts of the car while we were traveling along. After a time we determined we could hear the carbureter drawing in air, a slight tapping of one of the valves and a general hum that seemed to issue from the entire motor and was no doubt a combination of many small and unimportant noises. We then speeded the car up to 28 miles an hour, slipped the gears to neutral and threw off the switch allowing the car to glide along without a sound from the motor which was, of course, stopped. To our surprise we noticed a rattling sound from the rear of the car which we had not before noticed. After listening carefully we were able after some trouble to determine that the noises issued from two separate and distinct points. One was the

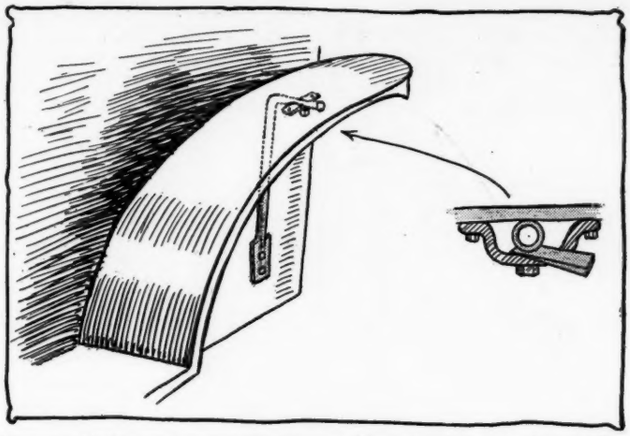


Fig. 4—Wedge will temporarily cure loose fender and stop rattle

license plate striking the Prest-o-Lite tank and the other was the fender over the rear wheel, which was loose.

The position of the license plate in relation to the acetylene tank was as shown in Fig. 3. There was about 1-4 inch space between the two and a road jar was sufficient to cause the license plate to strike the tank quite a hard blow. This was cured by inserting a block of rubber made from an eraser between the license plate and the tank.

The second rattle, that caused by the fender, was found to be due to the fact that the set screw which held the fender in place was too short. As shown in Fig. 4, this set screw fitted against the bracket and by turning it up hard held the fender rigidly in place. That is, it was supposed to do so, but the screw did not have sufficient length to bear tightly against the bracket. It was cured temporarily by the insertion of a wedge and afterwards permanently by the use of a longer screw. I think it would be a good plan for automobilists to state how they have rid their cars of troublesome noises of this nature, and I think that many will find noises which they never expected and which blended in with the motor noises while actually running if they tried the test outlined above.

Augusta, Maine. F. S. HIGHT.

More Views on Left Drive

Editor THE AUTOMOBILE:—I have read the argument on right and left control with great interest, but am forced even more strongly to the conclusion, based on ample experience with both right and left hand drive cars, that the right hand drive, with center cane handle control and both brakes operated by foot pedals, is the superior of any other form of steering and control arrangement, for both city and country driving. I can best give you the reasons for this belief by taking the points in your articles in series. I have had no experience whatever with motor trucks, and therefore am not in position to express an opinion as to which form of drive is preferable for them. What I shall say applies to pleasure cars of the open type only. It may be that even cars of the limousine type would handle better in traffic with the left hand steer, though I am inclined to doubt this, with the advantages of the right hand steer for other pleasure cars so obviously apparent.

For city driving. In few if any cities are all the streets as wide as they ought to be. A car for the widest range of usefulness with safety should seat the driver where he can watch all the possible danger points; not just some of them. The driver on the left side cannot watch the curb in the narrow street, but can only watch the oncoming car—and guess where the curb is from the look of it out ahead. The driver on the right can watch the curb close-hand (and in some cities the curb is lined with light and telephone poles) and he can also watch the oncoming car, for he is practically on a level with it, and he can judge the distance to the other fellow's fenders practically as close as if he were sitting on the left of his car. Here again

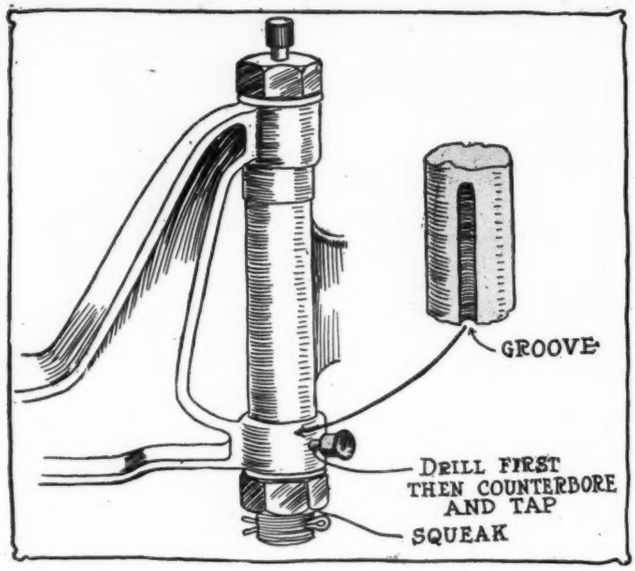


Fig. 5—Where the grease cup on the steering knuckle may be placed

comes in the point I have made before: The other car can move and has a driver to see that it gets through safely too, while the curbing is stationary, with no body to look out for it but the man in the car. There can be no question of the superiority of the right hand drive on country roads. In the anonymous communication on page 269 of your August 8 issue, I note the remark that party would much prefer the ditch to the oncoming car, if meeting on a narrow country road at speed. If such a meeting happened to take place in a narrow but deep cut such as is so often found in our roads, a position where the driver could not watch the drains at the side of the road might easily be the cause of a disaster to both cars.

There are, of course, some advantages in the left drive; if it were not so it would not have come to be adopted by some of the makers. But nearly all of the advantages claimed for the left drive can also be obtained in the right drive by proper construction and placing of control lever, proper clearance of steering wheel from seat, placing of doors, etc. Taking up the advantages claimed for the left drive, left side placing of control levers, as stated on page 210 of August 1 issue:

1. With right hand drive, center one lever control, both front seats are accessible from the curb.

2. The driver can get out more quickly than with any other construction, to open door and assist ladies to alight.

3. Is an advantage only as it concerns street cars or high loaded trucks, for one can always see ahead of a pleasure car which is being overtaken and passed, whether seated on the right or the left side. Also, he can see, before he tries to pass a car on a narrow road, whether he has room enough, whether seated on the right or the left. But if he essays to pass a car on a narrow road, his consideration must be for the car passed, not for his own car, and therefore the right hand drive car has the advantage here. In passing an approaching car, the advantage is all with the right hand drive, for I know from experience that I can accurately judge the distance between the fenders of my car and those of the car I am passing when driving from the right. And I can also see the curb and stationary vehicles, to whom my consideration, as the one in motion, is due.

4. There are few, if any, modern cars in which the weight of the driver on one side or the other can have any effect on the ease of driving or control, so this advantage of the left hand drive may be dismissed as immaterial.

5. Driver has a better view when turning to the left into a side street. Driver also has a poorer view when turning to the right into a side street, so these will balance each other well. It is true that when turning to the right into a side street, one must keep to the right anyway; but drivers on side streets usually drive all over the road and about as much caution is necessary as when turning to the left—and both sides of the street have a curb, on corners, that is easier to miss on one side with the left hand drive and on the other with the right hand drive.

6. It is not plain how and why it is easier to make the signal for the left hand turn from the left hand driver's position. As your writer points out, no signal is necessary when turning to the right, therefore any signal made means a turn to the left, and this is as easily made no matter which side the driver is sitting on.

Discussing the disadvantages of the right hand steer, center control, page 211 of same issue:

1. This, as experienced drivers can testify, does not comprise a disadvantage, as the distance between the fenders of the driven car and the met car can be accurately judged from the right hand driver's seat.

2. Is admitted, but balanced by the same objection to the left hand drive when turning to the right.

3. A driver should not want to pass a car going in the same direction without being sure there is room for such passing; but if he should attempt to pass, his first consideration must be for the car overtaken and not for his own car and the ditch on the left of the road. Therefore, in this item, the right hand drive is superior.

4. It is no difficult matter to design a lap robe that will fit over a center control lever, having a slot long enough to operate the lever through, and thus overcome this objection to the center control. I believe this is but a minor objection.

5. I know from experience that the left hand, after very little practice, is just as efficient as the right for gear shifting. It is a matter of habit.

6. By constructing the clutch and gearset mechanism so that the gears cannot be shifted until the clutch is entirely out, any possibility of the other passenger in the front seat tampering with the gear shift would be obviated.

Discussing the logical and illogical side of the right hand position in this country and abroad. Englsh drivers, before the day of the motor car, and Americans before they were Americans, became accustomed to sitting on the right of the vehicle they drove, and when the motor car came along we naturally put the steering apparatus on the right. That English and Continental laws require that vehicles turn to the left is but an incident; and it appears to this humble owner and driver that, if they would get the full advantage of their right hand drive cars, they should make their laws just opposite to what they are, making vehicles drive to the right, or built their cars with left hand drive—the one or the other.

Personally, I would never again buy a left hand drive car, preferring to buy a foreigner if necessary to get the right hand drive.

Fort Myers, Fla. C. L. JOHNSON.

How to Adjust the Stromberg

Editor THE AUTOMOBILE:—Would you kindly inform me through Letters Answered and Discussed how to adjust a Stromberg Model B3 carbureter.

New Madison, O. J. W. COBLENTZ.

—Before proceeding with the actual adjustment it is as well to make sure that no dirt is present at the gasoline connection as this is a not infrequent source of trouble. An examination can be made by removing the coupling C.

The Stromberg B type carbureter has two adjustments, one for high speed and the other for low speed. The two nuts for this purpose are shown at A and B in Fig. 6. In adjusting, first turn the nut A up or down until the spring A1, which it controls, seats the valve V lightly. See that the high speed spring B1 has plenty of play. Start the motor and turn nut A up or down until the motor idles properly. This is the low speed adjustment. Having found the correct position for nut A, advance the spark and open the throttle and if the motor back-fires through

the carbureter turn the high speed adjusting nut B up until backfiring ceases. If the mixture is too rich and the motor smokes turn this nut down. This is the high speed adjustment. There should always be at least 1-32 of an inch play between the top of the spring B1 and the nut at the top of the air valve stem when the motor is at rest.

Mounting of Ball Thrust

Editor THE AUTOMOBILE:—In reading a description of a new car which is to be placed on the market I note that special mention is made of the multiple disk clutch with a ball thrust mounted between the end of the crankshaft and the gearset shaft. Will THE AUTOMOBILE show how such a bearing is mounted and what is its real purpose?

Larchmont, N. Y. J. J. LESSING.

—The ball thrust is often mounted as is shown in Fig. 2, which is a part section through the clutch used on the 1913 Marathon cars. The purpose of the ball thrust is exactly what its name would suggest. It is supposed to receive the end thrust which would be caused through the driving and engaging stresses of the clutch and which would cause undue friction if permitted to fall on the other members of the clutch. The use of the balls reduces the friction to a minimum. In every clutch there is some arrangement for providing a special part for receiving the end thrusts and the use of balls for this service has proved a great success.

Thinks Noise a Piston Slap

Editor THE AUTOMOBILE:—Replying to Mr. C. Summers, Baltimore, Md., four-cylinder car, with tapping in one cylinder, I think his trouble is in one of the cylinders. If the tapping (or slapping, as I would call it) is to be heard only after the car has been running for a while or when the engine begins to warm up, then it is due to a loose piston. When the engine is cold the oil is thick and prevents the piston from slapping against the cylinder walls, but when the engine warms up the oil gets thinner and the piston will slap against the cylinder walls and will cause a noise which is called a piston slap.

Chicago, Ill. L. PLEIN.

Horsepower of Peugeot Racer

Editor THE AUTOMOBILE:—In a recent article in THE AUTOMOBILE describing the Peugeot racer the cylinder dimensions are given as 4.3 x 7.8 and horsepower as 175.

1—How is it possible to get such a H.P. from such a size when ordinary cars with cylinders of about the same size do not claim anything like as much?

2—I understand horsepower equals:

$$\frac{P \times L \times A \times N}{33{,}000}$$

. Is this correct?

3—What are the chief factors in increasing r.p.m. of crankshaft?

4—Will you give comparative figures for two cars of some established make for, say, one 30 horsepower and one of 50 horsepower for:

Size carbureter.
Diameter inlet pipe.
Diameter valve opening.
Valve lift.
Cubic contents of space swept by piston.
Cubic contents of combustion chamber.
Clearance of combustion chamber.
Compression pressure.
Mean explosion pressure.
Power strokes (or crank revolutions per minute).
Weight or size flywheel.

5—Do designers still use 1,000 feet per minute piston speed as a basis in designing?

6—What is meant by the expression heavy duty motor?

New York City, N. Y. DAVID W. SEAVER.

1—High compression, high r.p.m., lightness of parts and good design render it possible to get a higher horsepower than would be secured with the average motor. It is possible to include such features in a racing motor while it would be impossible to get them in an ordinary touring car for instance. This is especially true of the high compression and piston speed.

2—This is the correct formula for the indicated or theoretical horsepower.

3—High compression, shorter stroke, larger valves to admit gases more rapidly, advanced ignition and open throttle.

4—

	30 horsepower	50 horsepower
Carbureter, Schebler scale	1 1-4 inches	1 3-4 inches
Diameter inlet port	2 1-8 inches	2 3-4 inches
Diameter valve, mean	1 3-8 inches	1 1-2 inches
Valve lift	5-16 inch	3-8 inch
Piston displacement	226.2	588.6
Clearance	1 inch	1 1-16 inches
Compression	60 pounds	75 pounds
Mean explosive pressure	Unknown	Unknown
Revolutions per minute	1800	1800
Weight of flywheel	75 pounds	90 pounds

These figures really show nothing of value as there are too many other considerations entering into the comparison of two cars of different horsepower. They are given, however, for what they are worth and are taken from two cars actually in existence.

5—No. This is the basis of the S. A. E. horsepower formula

$$\frac{D^2N}{2.48}$$

6—A motor of heavy horsepower but low speed. By the formula under question 2, it is evident that if N, is low, any one or more of the factors P, L or A, will be correspondingly large.

Alcohol Burst into Flame

Editor THE AUTOMOBILE:—Your answer to a question regarding non-freezing solution, page 839, October 24, brings to mind a personal experience with a 40 per cent. wood alcohol solution last December.

While pulling through rather heavy mud on low gear a thick volume of smoke and flame burst from under the hood with a roar. The car was stopped, I crawled under and turned the gasoline off. Opening the hood on the carbureter side everything was found normal. On the other side some oil and rubber connections were still burning, the destruction of the latter being the only damage.

The fire being on the magneto side, I am satisfied its cause was the ignition of gases produced by the overheated and possibly boiling fluid. After this experience I deem the use of wood alcohol in the cooling medium a dangerous practice.

Fulda, Minn. EMIL KING.

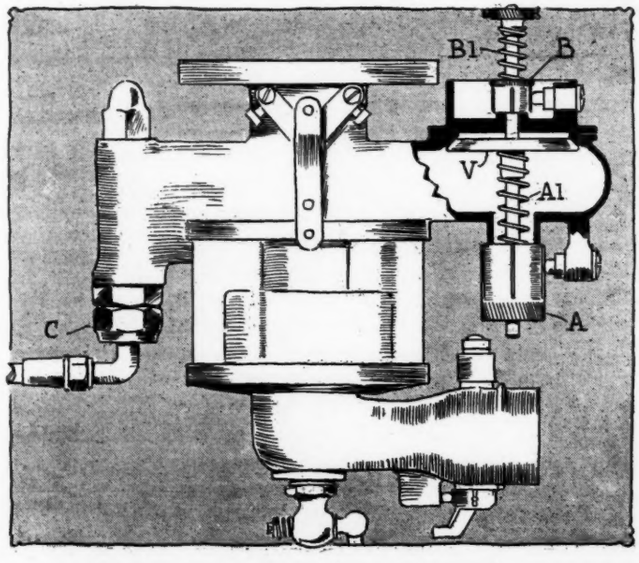


Fig. 6—Adjustment points on the Stromberg Model B3, carbureter

The AUTOMOBILE

Vol. XXVII Thursday, November 14, 1912 No. 20

THE CLASS JOURNAL COMPANY
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C. R. McMillen, Vice-President
W. I. Ralph, Secretary E. M. Corey, Treasurer
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To Subscribers—Do not send money by ordinary mail. Remit by Draft, Post-Office or Express Money Order, or Register your letter.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

English Tendencies

THE AUTOMOBILE prints this week its first technical review of the European cars as at present exhibited at the annual Olympia Show now in progress in London. This review brings out many important facts in connection with the English design which show the trend of construction. The English engineers were slow in taking up automobile design, and the makers were slow in perfecting the car, both due to a considerable extent to the restrictions on road-racing in the British Isles and also to the unreasonable road regulation laws in the early days of the industry. Since proper government regulation of the motor vehicle on the English highway has been obtained, the makers have taken up the development of the car in a truly determined manner, and have been exhibiting John Bull tenacity for the last few years, their development being such that continental Europe is only now adopting features of design which the English engineer perfected some years ago.

Perhaps nothing could excite more curiosity than the fact that the six-cylinder car, which received its original impetus at the hands of English manufacturers, is diminishing in numbers, the statistics showing that there are fewer six-cylinder models of English production scheduled for 1913 than there have been on the market during 1912. The explanation, to a large extent, rests with the horsepower tax, the gasoline tax and cost of operation. The owner has reached the conclusion that the four, in its present improved form, is giving very desirable service. It consumes little fuel, it gives the flexibility asked for, and has the desired power. Those makers who continue with a large list of sixes are reducing the horsepower or eliminating the high-powered models entirely. By carefully compiled statistics it was shown last year that the horsepower of the European six-cylinder car was over 30 per cent. below the American six, these figures being averages. The same is apparently true for the coming season, although the placing on the market of several lower-powered sixes by American companies will considerably reduce the average horsepower for the American six.

The English manufacturer is at last seeing the commercial phase of the automobile, and is slowly recognizing the fact that to continue existing as a manufacturing factor, he must shape his manufacturing course along economic lines. To explain: There is a general reduction in the number of models listed by the English maker for 1913. In fact, statistics show but one maker who has increased the number of models listed over those of the present year, whereas there are several who have greatly reduced the number. Apparently the days are passing in the insular kingdom when the maker thinks he must build a special model for every half-dozen customers.

One paradox presents itself in the 1913 car program as shown at Olympia, namely, that there is an apparent return to bevel pinion drive in the rear axle over worm drive, which came to the front so spectacularly 2 or 3 years ago. Worm drive was introduced because of its quietness, the demand for the quiet car being greatly accentuated by the non-poppet valve motor campaign throughout Europe. The present slight reversion to bevel drive would seem to show that the efforts of manufacturers in quieting bevel gears have been productive of much good, so that now the bevel is practically noiseless. If this is so, the credit must be given to worm drive, which proved the stimulant for the great activity in better cutting of bevel gears, and better axle design, which insures permanent quietness. It is not expected that the worm drive will show any perceptible decrease, but there is a country-wide feeling that it will more and more come into vogue, and particularly on commercial vehicles.

The progress in ignition has been confined largely to the progress of the magneto makers. This is shown in more compact instruments, which are made more weather-proof, and consequently more trouble-proof. Approximate statistics bring out the fact that nearly 80 per cent. of the European models listed for next year will use the magneto as the only system of ignition. The remaining 20 per cent. will be equipped with the dual system and the double system comprising magneto and battery. The implicit confidence that the maker is placing on the single magneto as a source of current, is an excellent commendation on the progress that magneto builders have been making.

The small motor has made the four-speed gearset practically universal. With large size motors direct drive is generally on the fourth gear, but with smaller-size motors direct is on third, with the indirect fourth of a higher ratio than the direct, giving a vehicle with good speed ability for country travel.

Detroit Section of Automobile Engineers Meets

Three Papers Read—W. H. Barr Treats of Copper Alloys for Motor Car Service—M. Wolf Discusses the B. & L. Caster Front Axle and R. H. Manson Deals with High-Frequency High-Tension Ignition

DETROIT, MICH., Nov. 8, 1912—At last night's regular monthly meeting of the Detroit section of the Society of Automobile Engineers, at which Secretary and Treasurer Alfred A. Greenburg presided in the absence of Chairman E. T. Birdsall, three very interesting papers were presented. The first of these was given by William H. Barr, general manager of the Lumen Bearing Company, Buffalo, and chairman of the Alloys Division of the Society. The subject was **Copper Alloys for Motor Car Service,** and it was treated in a masterful manner by Mr. Barr, who gave a short history of copper. He stated that in the United States **the metal is usually classified in three grades: Lake copper, that brought from the Lake Superior region; Electrolytic copper, that refined by the use of the electric current; and Casting copper, that which is not entirely refined, but carries varying amounts of impurities, and as a result is rapidly disappearing from commercial fields.**

The United States produces more copper than any other country, or about 65 per cent. of the total production of the world, the total amount for 1911 being 1,090,000,000 pounds.

Mr. Barr also touched upon the production, refinement and commercial uses of the various metals which are alloyed with copper to make bearing metals, namely, tin, zinc and lead. Brasses and bronzes were taken up at some length and the action of such chemicals as arsenic, antimony and sulphur on these alloys was explained. These three elements have a detrimental effect upon bronze, but sulphur in proportions which have been carefully determined by metallurgists is a beneficial agent.

The high copper alloys, as related to motor car construction, may be divided into four classes: Soft phosphor bronze; hard phosphor bronze; red brass; yellow brass. The properties, uses and general composition of these were explained.

"From the standpoint of the automobile engineer, it would seem that the same detailed attention should be given to the non-ferrous alloys in motor car construction as is given to steel products and appliances. Too often, the decision as to what brass or bronze may be used is left to the purchasing department, where price alone governs the selection," said Mr. Barr.

In the discussion of the paper which followed it was asked if there would be any value to any means of hardening copper. Mr. Barr stated that no way has been found to harden pure copper. He also brought out that there are two concerns now making copper castings in which it is possible to guarantee an electrical conductivity of 85. Ordinarily a conductivity of from 45 to 60 is considered good.

C. C. Hinkley wanted to know if it were possible to get a combination of low shrinkage and high wear in a babbitt metal. To this Mr. Barr replied that an alloy containing not less than 90 per cent. of tin, 4 per cent. of copper and 6 per cent. of antimony would come as close to these requirements as any. Perhaps a little less tin could be used. The antimony serves to reduce the shrinkage.

When asked if a small percentage of nickel would be of advantage in these alloys, Mr. Barr stated that as a result of many tests he has come to the conclusion that **nickel is of little or no advantage. The effect of cobalt or any other similar element is about the same as that of nickel.** He does not believe in nickel babbitts.

This discussion was followed by a paper by Maurice Wolf, of the Anderson Forge & Machine Company, Detroit, which paper treated upon the **B. & L. Caster front axle, setting forth its construction and the advantages which are claimed for this type over the standard front axle.** A paper which was in the form of a discussion of that of Mr. Wolf was read by Ernest R. Fried, research engineer of the General Motors Company. Mr. Fried did not agree with all the claims made by Mr. Wolf.

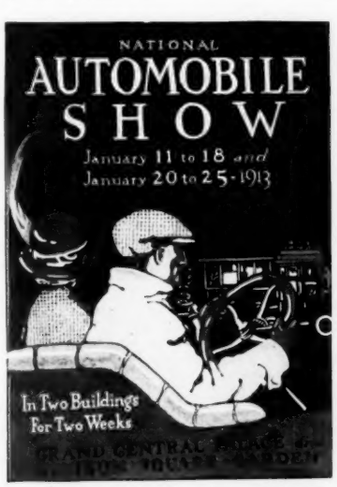
A most comprehensive paper by Ray H. Manson, chief engineer of the Dean Electric Company, Elyria, O., entitled **High-Frequency High-Tension Ignition,** was next presented. According to Mr. Manson, the use of high-frequency, high-tension electric spark for ignition in the internal combustion engine introduces several unique and advantageous features. A high frequency discharge is in the form of electrical oscillations, these oscillations rapidly succeeding one another, each succeeding one being of less intensity than the one preceding, and gradually dying down to zero. **This electrical oscillatory action is similar to the mechanical vibration of a strip of metal or a tuning fork,** which is firmly held at one end in a vise and given a blow. Its first vibration is the maximum, those following finally reducing to nil. **The chief advantages Mr. Manson gave for this type of ignition are:**

1—Cranking on magneto at very low speeds.
2—Throttling the engine down to extremely low speeds without missing.
3—Positive ignition of poor mixtures.
4—Less heating of engine, due to more rapid and thorough combustion of gases.
5—Fuel economy, due to ability to ignite lean mixtures positively.

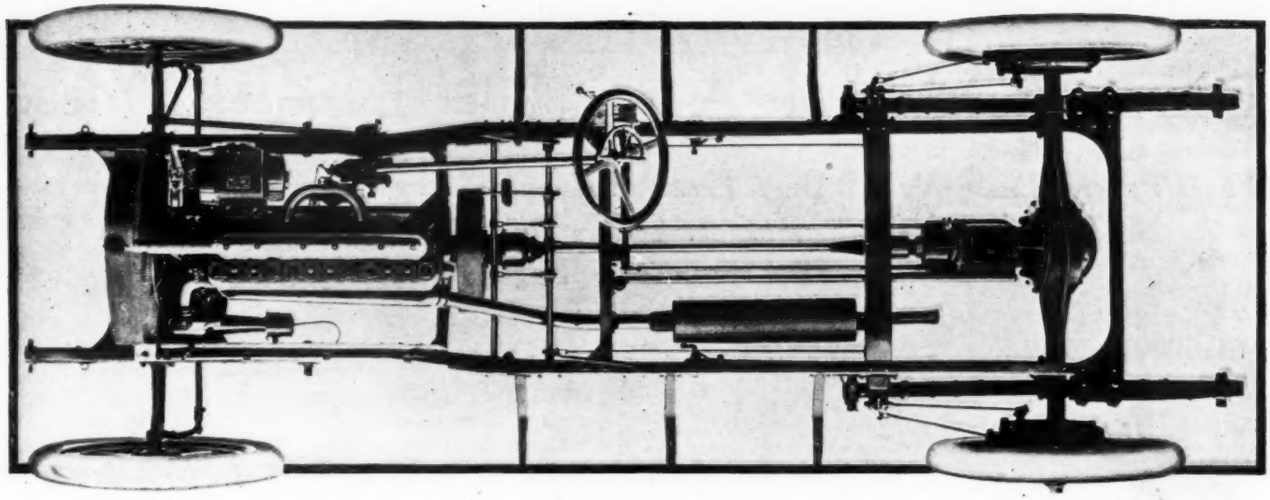
The high frequency magneto system consists of a low-tension magneto with breaker box and low-tension distributer, built very similarly to a standard magneto with the exception that the armature is wound with fairly coarse wire and that the condenser is stationary. The latter is located on the front of the distributer.

In the case of the high-frequency system, spare resonators may be carried, if desired, and these may be mounted as readily as spark plugs. On the other hand, the repairing of a broken-down high-tension armature or a common transformer coil is very difficult and requires an expert.

In addition to touching upon the high frequency magneto system, Mr. Manson explained the high-frequency dual system, battery system and double system. The paper was an introduction to this new field of ignition. **Mr. Barr's paper on Copper Alloys for Motor Car Service will be reprinted in full in an early issue of** THE AUTOMOBILE.



Prize poster for the National Automobile Show to be held in New York City January 11-25



New six-cylinder chassis of Studebaker with monobloc motor casting and electric lighting generator

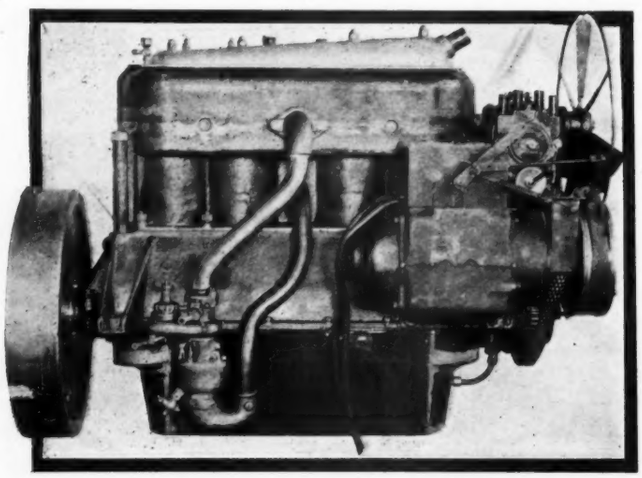
Three New Studebakers

New Motor Designs on Additional Models, Using Monobloc Cylinder Castings—Numerous Other Changes

Six-Cylinder Is One of New Types—Continue the Models 20 and 30 of this Year

THREE entirely new models have been added to the line of automobiles manufactured by the Studebaker Corporation, Detroit. These consist of two four-cylinder types, designated models 25 and 35, and a six-cylinder machine. They swell the offering of the Studebakers to five distinct chassis, models 20 and 30 being continued with no radical changes whatever, and embodying practically all the essential features which have distinguished them since their inception some 5 years ago. It is interesting to note that during the selling season just passed 42,000 of these two models left the Studebaker shops.

Particular interest centers in the three new models, since they are a brand new series and involve a number of features which are new to Studebaker construction. That this concern should enter the six-cylinder field at this time is but another striking instance of the belief of the big makers in the low-priced six.



Right side of Studebaker model 35 motor

Motors of the newcomers are all of the same design, being of the L-head monobloc type with the valves on the left side. The cylinder dimensions of the six-cylinder engine and of the twenty-five are the same—3.5 inches bore and 5 inches stroke. The larger four, model 35 has the same stroke, 5 inches, but the cylinder bore is 4 1-8 inches. On the block, these motors have shown a brake horsepower considerably in excess of that which the S. A. E. formula would give them. The table below gives some facts about the three new power plants:

Model	Bore Inches	Stroke Inches	B/S Ratio	Brake H.P.	Firing Order	Wheelbase
25	3.5	5.00	1.43	26	1-3-4-2	101
35	4.125	5.00	1.21	35	1-3-4-2	116
Six	3.5	5.00	1.43	45	1-5-3-6-2-4	121

The block cylinder castings present a very clean appearance. Intake and exhaust manifolds are cast integrally, but in somewhat different manner from that usually found in multiple-cylinder castings. The gas enters the intake channel on the side opposite from the valves, being led through the casting to the left side and thence to the intake ports of the various cylinders. In passing through the casting to these ports on the opposite side, the gas is somewhat heated due to the hot water in the adjoining jacket spaces, and to the heat of the neighboring cylinder walls.

This heating of the gas aids materially in its vaporization and amounts to virtually water-jacketing the intake manifold. Even distribution of the gas to all cylinders is provided for by the form of the intake channels. The carbureter is a Studebaker design and is very similar to that used on model 20. It is of the venturi-tube type.

The exhaust manifold on the left is not flush with the outer vertical wall of the waterjacket, but extends beyond it, making for free exhaust. This design has been carried out in other monobloc types, but not exactly in that way.

The pistons have polished, domed heads, that is, their faces are not flat, but are crowned. This construction is an aid in reducing carbon deposits. They are cast from the same grade of gray iron as is used for the cylinders. Four rings are fitted, three above the wristpin and one below. The drop-forged connecting rods are of I-section. Wristpins are fixed to the connecting-rods, the bosses forming the bearing surfaces.

The crankshaft is carried on three main, plain babbitt bearings in the four bearings in the six. The camshafts are similarly mounted in the three engines. The various bearing lengths follow:

Crankshaft Model	Front	Center	Rear
25	2.781	2.500	3.437
35	3.000	2.938	4.500
Six	2.781	2.500	3.437
Camshaft			
25	2.110	1.250	2.500
35	2.079	1.375	1.875
Six	2.110	1.250	2.500

Camshafts have integral cams and oil pump eccentrics for driving the plunger oil pumps. These camshafts are driven from the crankshafts by half-time gears, spirally cut and wider than those used on previous models. All are forgings except the camshaft gears, which are of cast iron. The different material is used to insure silence, since the running of hardened steel against the same material would not be conducive to noiseless operation. The wide faces of the gears and their spiral cut are other factors which aid in this respect.

Valves are of the beveled poppet type, the stems electrically welded to the forged heads. Their lift is 1-4 inch. Push rod guides are cast iron and are pressed into the cylinder castings. Valve springs and rods are completely inclosed by cover plates of pressed steel, which are removed by the taking off of two hand nuts. Valve details follow:

Model	Diameter	Length with Stems
25	1 13-16 inches	6 1-4 inches
35	2 5-32 "	7 13-16 "
Six	1 13-16 "	6 1-4 "

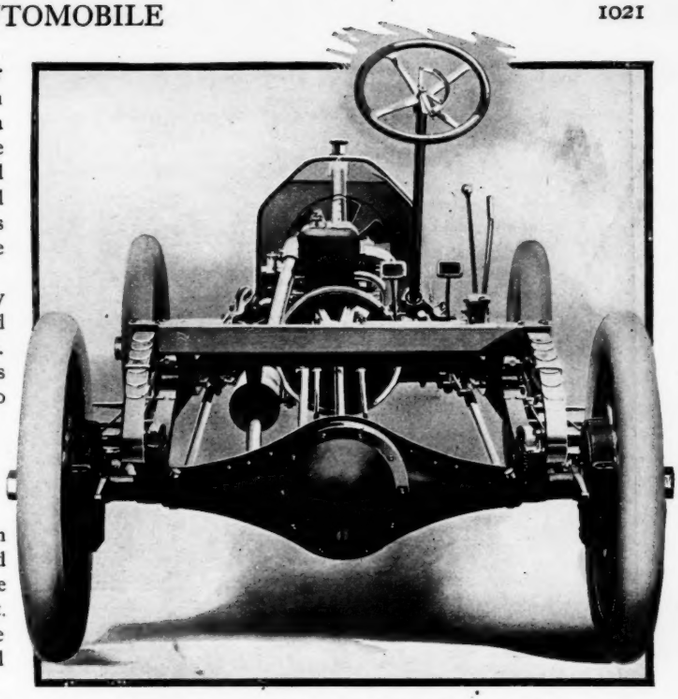
A feature of the motors which is distinctly a departure from previous designs of this concern is the location of the pump and magneto in front of the engines on brackets which bolt to the crankcases. Pump and magneto are driven by a transverse shaft. The magneto is mounted at the right end and the sump at the left. This cross shaft is driven by spiral gearing at its center and from the crankshaft.

The magneto is a Splitdorf. Batteries furnish starting ignition current.

The location of the water pump forward makes it possible to connect its outlet direct to the cylinder casting at the front. Water is forced into the jacket space in line with the valve pockets, insuring cool water around the valves. This is possible on account of the relatively high position of the pump, which is above the crankcase.

Lubrication is accomplished through the use of a circulating oil pump and the conventional connecting-rod splash. The oil is pumped from a reservoir at the bottom of the crankcase up through a sight feed gauge on the dash, and then through a lead to the magneto and pump shaft gear. It flows down over the timing gears and is eventually directed along the inside of the crankcase wall to the troughs which are in the false bottom of the crankcase. There is one of these troughs under each cylinder, and the lower ends of the connecting rods dip into them. The overflow from the troughs and from the bearings finds its way to the reservoir at the extreme bottom of the crankcase, where it is strained before the pump returns it to the sight feed, timing gears and troughs. All of the pipe line joints are fitted with Lavigne solderless pipe couplings.

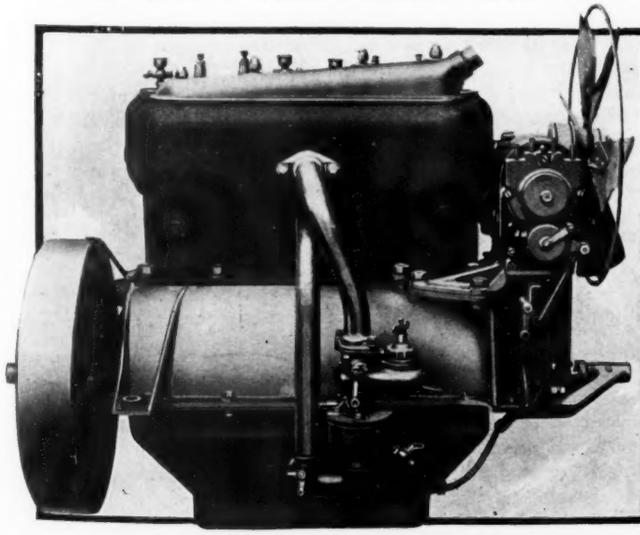
The oil reservoir is replenished through the breather pipe at the left side. Also at the side and extending up from the bottom of the reservoir, is the oil level indicator.



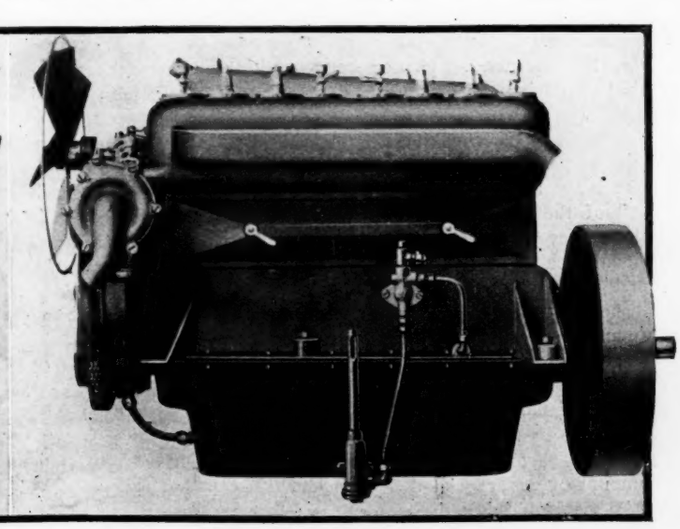
Rear axle construction on Studebaker model 35

The self-starter proposition has not been lost sight of in these new Studebaker offerings. On models 35 and six a combined self-starting and lighting system is installed, which system is manufactured exclusively for the Studebakers by the Wagner Electric Mfg. Company, St. Louis. In fact, the entire electric-starter output of this latter factory has been contracted for by the corporation.

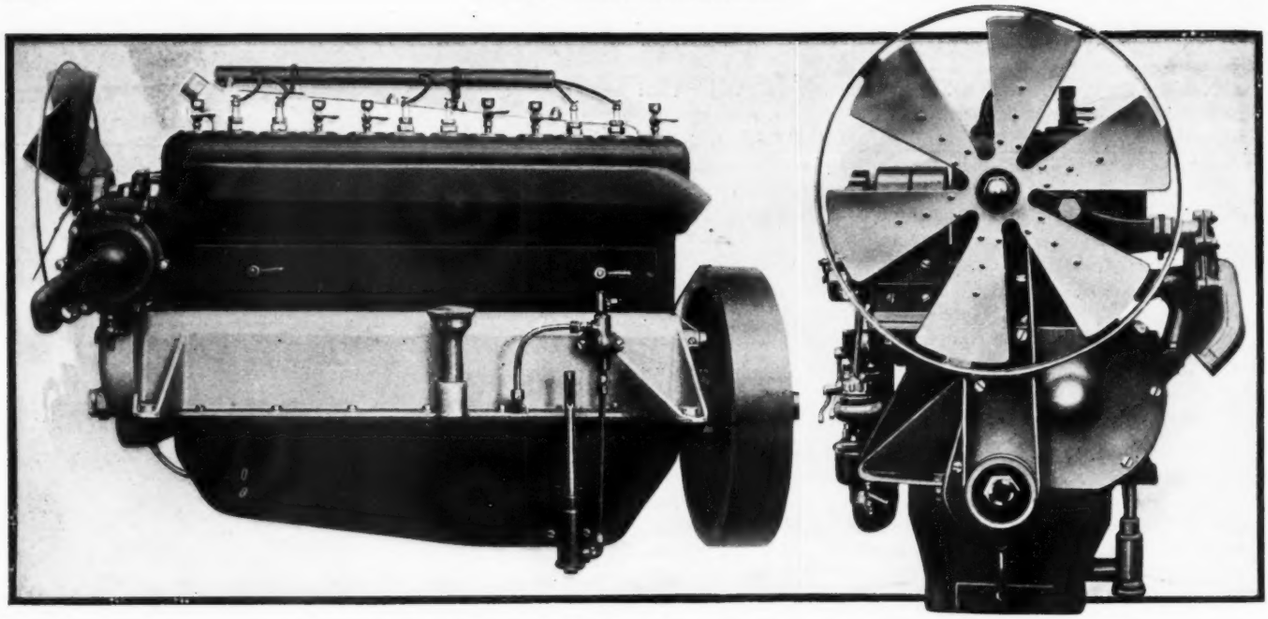
The starter is of the motor-generator type, placed at the right at the forward end, and connected with the crankshaft by silent chain. When used for generating current after the gasoline motor has been started, the generator is driven direct from the crankshaft, the gear ratio being 2.65 to 1. But when the electric motor is called upon to start the engine, a set of transmission gears are brought into play which reduce the driving ratio to 13.2 to 1, increasing the electric motor's torque and causing it to turn the crankshaft at a speed of about 80 revolutions a minute. When driven by the engine as a generator, the electrical unit will furnish current at a crankshaft speed as low at 300 revolutions per minute.



Intake side Studebaker model 25



Exhaust side Studebaker model 35



Exhaust side of Studebaker six-motor and end view of Studebaker design

A six-cell, nine-plate storage battery having a rated capacity of 60 ampere-hours and a voltage of 12 is used in connection with the generator-motor. When acting as a generator, the latter furnishes current to this battery, from which the energy is drawn for lighting the lamps and for driving the electrical unit as a motor when required for starting. The battery, when fully charged, will furnish sufficient energy to the motor-generator to turn over the crankshaft for several minutes continuously, or it will keep the lights burning for 13 hours.

The motor-generator has a self-contained automatic regulating device and by a carefully designed system of field winding and commutation, the current output of the generator is so controlled that it is impossible to overcharge the battery at any time. When the speed has reached 300 revoluions per minute an automatic cut-out mounted under cover on the generator closes the battery circuit. Charging continues until the engine speed drops below 300 revolutions per minute, when the automatic cut-out breaks the circuit again, preventing a discharge of the battery through the generator.

To crank the engine, the driver pulls up on a lever located on the steering column just below the wheel. This shifts a controller drum on the generator to a second position and simultaneously tightens a brake band around the cylindrical gearbox of the apparatus. The controller shift makes the starting connection, and the tightening of the brake band throws into operation the transmission gearing between the motor and the crankshaft, reducing the driving ratio to 13.2 to 1, as already pointed out.

The Studebaker engineers state that the only care necessary for the proper up-keep of this electric starting and lighting system is the addition of a little pure water every 2 weeks to each cell of the battery so as to keep the plates immersed. Acids should never be added. Further, a few drops of oil should occasionally be applied to the ball bearings of the motor generator, and periodically the controller and cut-out contacts should be inspected to see that they are clean and that no dirt or oil has found its way under their cover.

The storage battery is placed on the left running board, and the motor-generator is on the right side. Hence the additional weight of the starting system does not affect the car's balance.

On the 25 there is no starter, but an acetylene gas primer is installed as an aid to starting. This primer allows a certain amount of gas, regulated by a needle valve, to pass into the intake manifold when the motor is cranked.

Except for difference in wheelbase the design of the six-cylinder chassis and of model 35 is the same. Some variations are to be found in that of the smaller four-cylinder model.

The clutches used on these cars are of the cone type similar to that of the present model 30. It requires a force of 31 pounds to press down the clutch pedal of model 25 and engagement of this member on the other two models requires a force of 45 pounds.

It is in the transmission of the power from the clutch to the gearbox that the greatest difference between models 25 and the other two comes. The smaller car has its drive shaft enclosed within a torque tube whereas in the case of the 35 and the six a stamped-steel torque arm extends from a frame cross member back to the gearbox and parallel to the propeller shaft. These drive shafts are properly provided with universal joints one just back of the clutch and the other at the rear axle.

The gearsets of all three models are located at the rear axles, the gearcases bolting to the axle housings. The gearsets provide three forward speeds, operating selectively. On the two larger cars the gearset has two ball bearings in the front of the driveshaft and an extra large roller bearing back of the drive pinion. The countershaft is carried on plain bearings. The gearboxes as on models 35 and six are of aluminum and are cast with extensions forming the bases for the differential bearings, which is a new feature in Studebaker construction.

Model 25 has a semi-floating rear axle and on the other two a floating type. The differential pinion is placed on the shaft by sliding it to a position over the latter's splined end and fastening with a nut. A cover plate at the back of the axle housing provides for easy inspection of the differential gears and the driving pinion. In the floating construction the weight of the car is carried on the housings, the pinions having simply to perform the functions of driving the wheels. The direct drive ratio on all models is 3 1-2 to 1.

The brakes act on the rear wheels. The emergency brakes are internal expanding, while those for service use contract upon the drums. The brake dimensions are given:

Model	Brake drum diameter	Brake drum width
25	9 3-4 inches	2 1-4 inches
35	12 "	2 1-2 "
Six	12 "	2 1-2 "

Frames are constructed from hot-rolled sheet steel. They are narrowed in front to allow for shorter turning radius. Frames of the 35 and six have a rear kick-up. The frames are well braced at three points by cross-members, the rear member having gusset plates at its ends to which the ends of the side frame members fasten as well as the springs.

The turning radius for the smaller chassis is 16.5 feet, while it requires a circle 44 feet in diameter for the larger models.

The springs are outside the frames in the rear. Rear springs are elliptic on the 25 and three-quarter on the other two. Their dimensions follow:

Model	Length—Inches	Width—Inches	Type
25	Front 36 1-2	1 3-4	Half-elliptic
	Rear 35 1-2	1 3-4	Elliptic
35 and Six	Front 38	2	Half-elliptic
	Rear 50	2	Three-quarter elliptic

Right-hand control is found on all models, with brake and clutch pedals, spark and throttle levers, and so on, in standard form. The steering gear is of the worm-and-full-gear type, irreversible.

All wheels are of artillery construction, and on models 35 and six they are fitted with Booth demountable, quick-detachable rims. The rims of model 25 will not have the demountable feature as standard equipment. The felloes are slightly rounded, which adds to the general appearance of the wheels.

Tires on model 25 are 30 by 3.5 inches and on the other models 34 by 4 inches. All are of Goodrich quick-detachable make.

The designs for the bodies of all three cars are alike, in fact, the standard types for both the larger four and the six-cylinder car are identical. The standard model 25 body is a four-passenger type, and the other two machines will carry six. Two seats in the latter are auxiliary and are designed to fold out of the way when not in use.

Fenders on the 35 and the six will be crowned, which makes a pleasing effect. Running boards are of wood, lineoleum-covered with polished moulding around their edges on these two models, and model 25 is provided with pressed-steel running boards. All models are equipped with Dean electric horns mounted under the hoods. Buttons for operating them are placed on one of the spiders of the steering wheels. Equipment is complete in every respect.

Density Not Only Fuel Factor

There is a widespread opinion that gasoline of a certain density, say 68, 70 or 72 degrees Beaumé, is the best to use. The advocates of the theory that specific gravity, in other words, weight per unit volume, of fuel is a positive indication of its fuel value are very much mistaken. A fuel may be concocted to produce any desired density between 68 and 76 degrees, and yet have by no means the fuel properties which automobilists are used to attribute to gasoline of such weights. As a matter of fact, it has happened that gasoline producers have specially prepared inferior fuels of a specific gravity considered especially suitable by automobilists. The taking of specific gravity as the sole criterion in selecting fuel is as fallacious as the establishment of the flash test as exclusive basis in judging the quality of a lubricant. The high flash test of an oil in itself does not necessarily constitute a good lubricant. Likewise, only the chemical analysis of a fuel, which, of course, is out of the question in case of a small user, can show whether he gets what he expects and what he is entitled to, or not. It is the maximum contents of hexane in the gasoline which makes the fuel value, as this hydrocarbon combines high volatility with a fairly high hydrogen percentage, upon which the latent heat of combustion depends to a great extent.

Harking Back a Decade

FROM *The Automobile and Motor Review,* November 8, 1902:

The 1903 model of the Stanley steamer has made its appearance at Newton, Mass. The motor has two cylinders and is of the ball-bearing, cross-head type. The engine is suspended horizontally under the boiler and is geared direct to the differential, the usual sprockets being replaced by spur gears.

The new automobile terms garage, meaning a storage warehouse; chauffeur, meaning a person who heats something; control, meaning a place or station where control is exercised and mechanician, meaning mechanic, proved rather confusing to the press at large during the recent reliability run to Boston and return. The words are generally pronounced by the non-French lay public as if spelled gar-aw-ish, with the accent on the middle syllable; sho-ffoor and me-can-i-can, with the accent on the second syllable. The meaning of control apparently escaped everybody but the officials and puzzled a number of them.

The competition of tractors for military purposes, announced some time ago by the War Department of the British government, has been postponed until October, 1903.

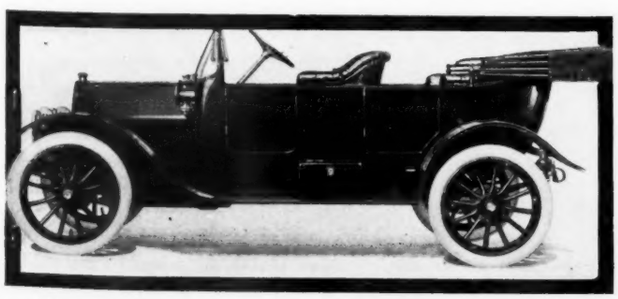
Reports are current in London that the American manufacturers of automobiles are planning an extensive invasion of the British market. The Oldsmobile already has quite a patronage in England and the Rambler is about to be introduced. The British trade take the position that the larger American cars can never have much sale because the British public refuses to buy cars that lack individuality. For instance if Jones has a Rambler and Smith wants one, he will refuse to buy because his car would be identical with that of his neighbor. American manufacturers are warned not to try to sell cars equipped with cross lever steering gear.

The Diamond Rubber Company, of Akron, O., denies that it contemplates the installation of a factory at Glasgow.

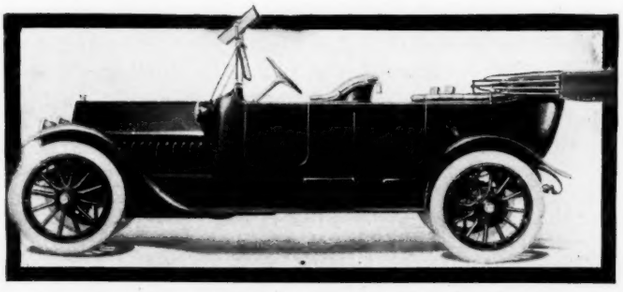
W. Byrd Raymond, a professional driver of New York was sentenced to 6 months in jail without option of fine for alleged negligence in driving his Winton car which figured in a collision with a street car near Yonkers, October 26. Mr. Byrd was sent to the Kings County penitentiary; his hair was clipped and moustache shaved and he was forced to don striped clothing. Twenty-two persons were slightly hurt in the crash. Raymond was released from the penitentiary on a writ of habeas corpus almost immediately on the ground that there was reasonable doubt that the automobile was responsible for the car's derailment.

The Ohio Automobile Company, of Warren, has changed its name to the Packard Motor Car Company and has had plans drawn for two large one-story buildings to be erected at Warren immediately. It is asserted that when these are completed, the company will have one of the largest plants in the country. A circular letter has been sent out that the rumored removal of the plant from Warren to Detroit is in error.

Three of the largest tire companies of the country have consolidated. They are the Hartford Rubber Works Company, Indianapolis Rubber Works and Morgan and Wright. The brands of tires made by the companies include: Hartford, Dunlop, G. and J., and Morgan and Wright. Lewis D. Parker has been elected president.

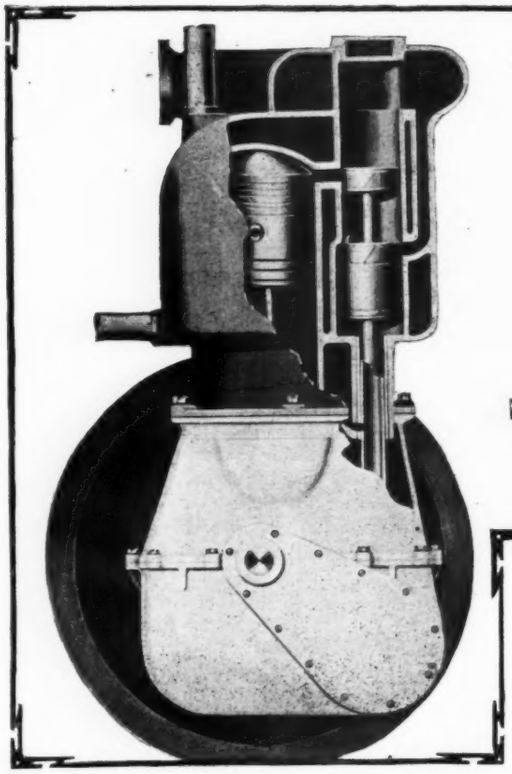


Studebaker model 25 touring car



Studebaker six-cylinder touring car

Laycock's Motor Uses Dumb-Bell Valves



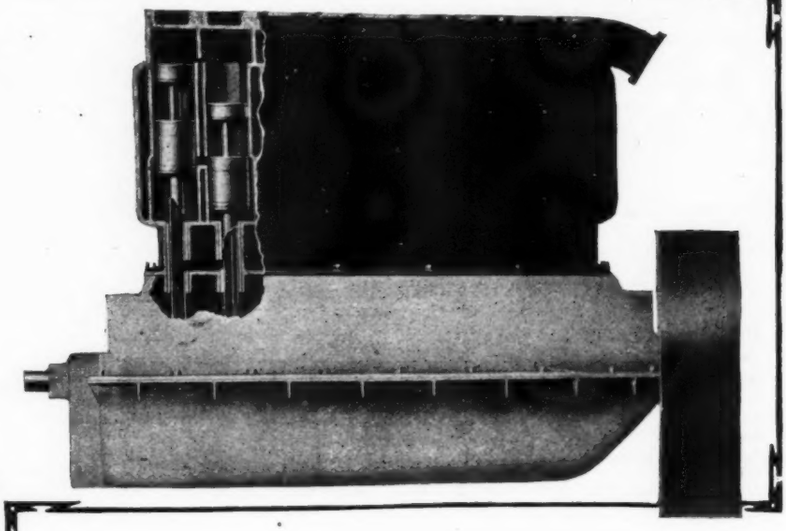


Fig. 1—Transverse section of the Laycock Motor
Fig. 2—Partial section and longitudinal view

Inventor Claims Improvement in Scavenging as Well as Silence by Use of Combination Piston and Sleeve Valve; Small Piston Head Clearance

ARTHUR M. LAYCOCK, of Detroit, has brought out a motor which is attracting considerable attention on account of the novel valve arrangement. As will be seen in the accompanying illustrations there are two separate piston valves used with each cylinder, one for the intake and one for the exhaust. These valves are of the dumb-bell piston type and may be counted on the same or opposite sides of the cylinder.

In exterior appearance the motor does not vary greatly from the regular poppet type. The piston and connecting rod assembly is identical with a motor of the latter type except that, as is shown in Fig. 1, the head of the piston is much closer to the top of the cylinder. According to the inventor the clearance between the cylinder and the piston at the top of the stroke is only about 1-16 inch, or just sufficient to contain enough gas to carry a flame. This will reduce to a minimum the volume that can be occupied by the burnt gases after combustion, and there is consequently a minimum of scavenging work to be done. The waterjackets are made to extend over the cylinder head and around the valve ports in the manner shown in Fig. 1.

The valves are actuated from a camshaft which may be placed in any desired position. In Figs. 3 and 4 the camshaft shown is placed on a level far below the axis of the crankshaft. In this construction the valve passages and the cylinders are parallel with one another and as may be seen the valve mechanism requires a long space. This can be shortened, however, by allowing the axial lines of the cylinders and the valve passages to diverge downwardly.

The valve passages as shown in Fig. 4 are in two parts. The upper part contains the piston valves, while the lower part contains the operating sleeves which are contained in anti-frictional tubes and reciprocate therein. The valve stems are operated at their lower end by connecting rods off the cam-shaft. The manner in which the valves are driven however, is arbitrary and does not alter the principle of the motor in the least. If the camshaft is driven by gearing it is so arranged that the speed of the camshaft is one-half that of the crankshaft.

In Fig. 4, the motor is shown at the end of the scavenging stroke. The piston is about to move downwardly and the exhaust valve is moving up. The crankshaft and the camshaft both turn to the left with the camshaft turning at one-half crankshaft speed. At this part of the cycle the exhaust port is closed by the outer portion of the exhaust valve and the space between the upper and lower part of the exhaust valve is filled with explosive mixture, as will be described. As the piston starts down on the suction stroke, the exhaust valve moves up and prevents any circulation through the exhaust port. While the exhaust valve is going up the intake valve is coming down, as shown by the dotted lines in Fig. 4, the exhaust and intake valve cranks being 90 degrees apart. At the end of the suction stroke the exhaust valve will be at the top of its stroke, while the intake valve will be at the same height as the exhaust valve, as indicated in Fig. 1.

As the exhaust valve was rising a vacuum was created beneath it within the tube containing the hollow valve stem. As will be seen in Fig. 1, there is a port in this valve stem and also one in the tube which contains it, the latter port leading to the intake valve and being connected thereto by a short tube. When the port in the hollow valve stem registers with the port leading to the intake pipe, the explosive gases will rush in and fill the space below the exhaust valve. When the valve descends the

gases are compressed in the hollow portion below the valves and at the bottom of the stroke are allowed to pass around the valve into the space between the two parts of the dumb-bell, as shown in Fig. 1. The by-pass will be noted on the left side of the exhaust valve in Fig. 1. These new unburnt gases will force out the remaining dead gases through the upper passages in the same manner that a two-cycle motor is scavenged by the admission of the fresh gases. In case it is desired to scavenge the cylinder with air instead of with the fresh charge it is merely necessary to remove the pipe that connects the intake with the port leading to the hollow valve stem and allow air to pass through in the same manner as described for the fresh charge. In case this is done the carbureter adjustment will have to be altered to take care of the leaner mixture that would result should the charge be allowed to mingle with the air that will fill the valve passages. The scavenging work of the motor will be appreciated with this arrangement in connection with the greatly reduced clearance between the top of the piston and the cylinder head when the piston is on the top of its stroke.

At that point of the cycle when the motor is ready for the explosion stroke the the explosive gases are contained within the small space between the top of the piston and the cylinder head and within the exhaust and inlet valve passages. When the explosion of the gases within the dumb-bells takes place there will be no undue strain on the valves because they will be balanced, the areas of the upper and lower parts being similar. During the entire working or expansion stroke of the piston the valve spaces will be in communication with the cylinders so that the space between the upper and lower portions of the valves are an active part of the expansion or combustion space. At the end of the expansion stroke both the intake and exhaust valves are on the down stroke. The exhaust valve uncovers the exhaust port and leaves it uncovered during the entire scavenging stroke. This completes the cycle and leaves the piston and valves in the position first mentioned. The most important of Mr. Laycok's patent claims are as follows:

Important Claims in Laycock's Patents

1. In an internal-combustion engine, the combination of a cylinder, a piston therein, a valve-chamber adjacent said cylinder and connected thereto by a port, said chamber provided with an inlet port at its lower end for the admission of air, an exhaust port intermediate its ends for the exhaust of the air, and a by-pass in its wall, a valve movable in said chamber and formed of two parts so as to constitute a receptacle for the compressed explosive mixture at the time of the explosion, the lower part of the valve controlling the passage of air through said by-pass and exhaust port of the valve chamber.

2. In an internal-combustion engine, the combination of a cylinder, a piston therein, a valve-chamber adjacent said cylinder and connected thereto by a port, the lower end of said valve-chamber forming a compression chamber having a by-pass in its wall and a port opposite the upper end of the by-pass, a valve in said chamber formed of two cylindrical parts, means to so position the valve that the space between its parts will be opposite the cylinder port during the working stroke of the piston, and to so move the valve that said space will be in line with the upper end of the by-pass and the port opposite the same so said space may be scavenged after each explosion.

3. In an internal-combustion engine, the combination of a cylinder, two cylindrical valve-chambers adjacent thereto and connected thereto by ports, a valve movable in each chamber and comprising two connected pistons, a hollow stem for each valve, a guide therefor having an aperture registering with a port in said stem when at the upper end of said stroke, said stem having a second port which opens into the lower end of the valve chamber when the stem is at the upper end of its stroke, and means to actuate said valves.

4. In an internal-combustion engine, the combination of a cylinder, two cylindrical valve-chambers adjacent thereto and connected thereto by ports, a valve movable in each chamber and comprising two connected pistons, a hollow stem for each valve, a guide therefor having an aperature registering with a port in said stem when at the upper end of said stroke, said stem having a second port which opens into the lower end of the valve chamber when the stem is at the upper end of its stroke, and means to actuate said valves, each valve-chamber having a by-pass in its wall to permit communication around the lower valve-piston when at the lower end of its stroke, and an exhaust passage which is opened by said lower piston when at such lower end of its stroke.

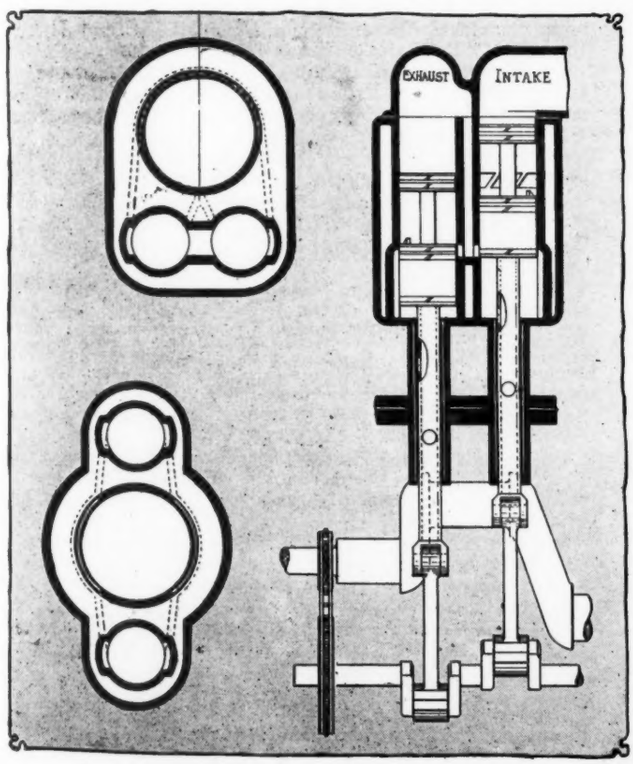


Fig. 3—Plan and elevation of the valve mechanism

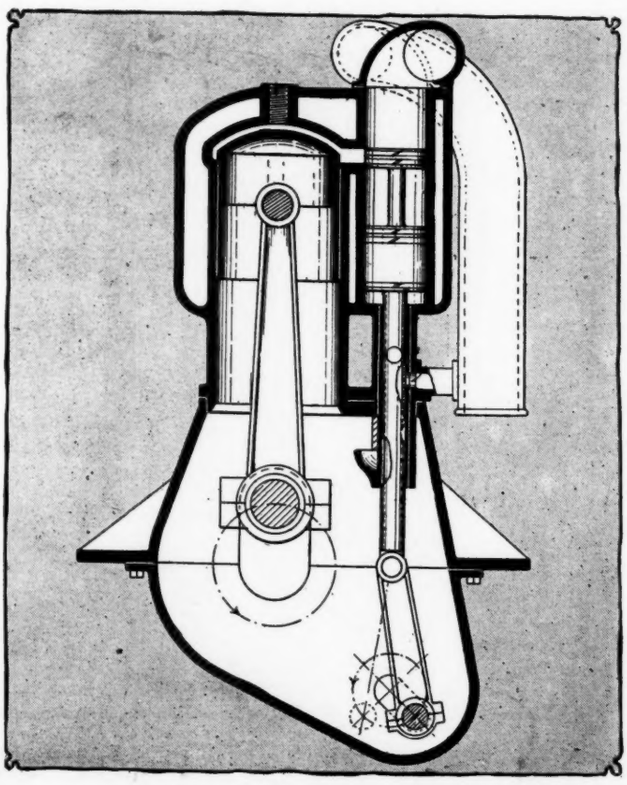
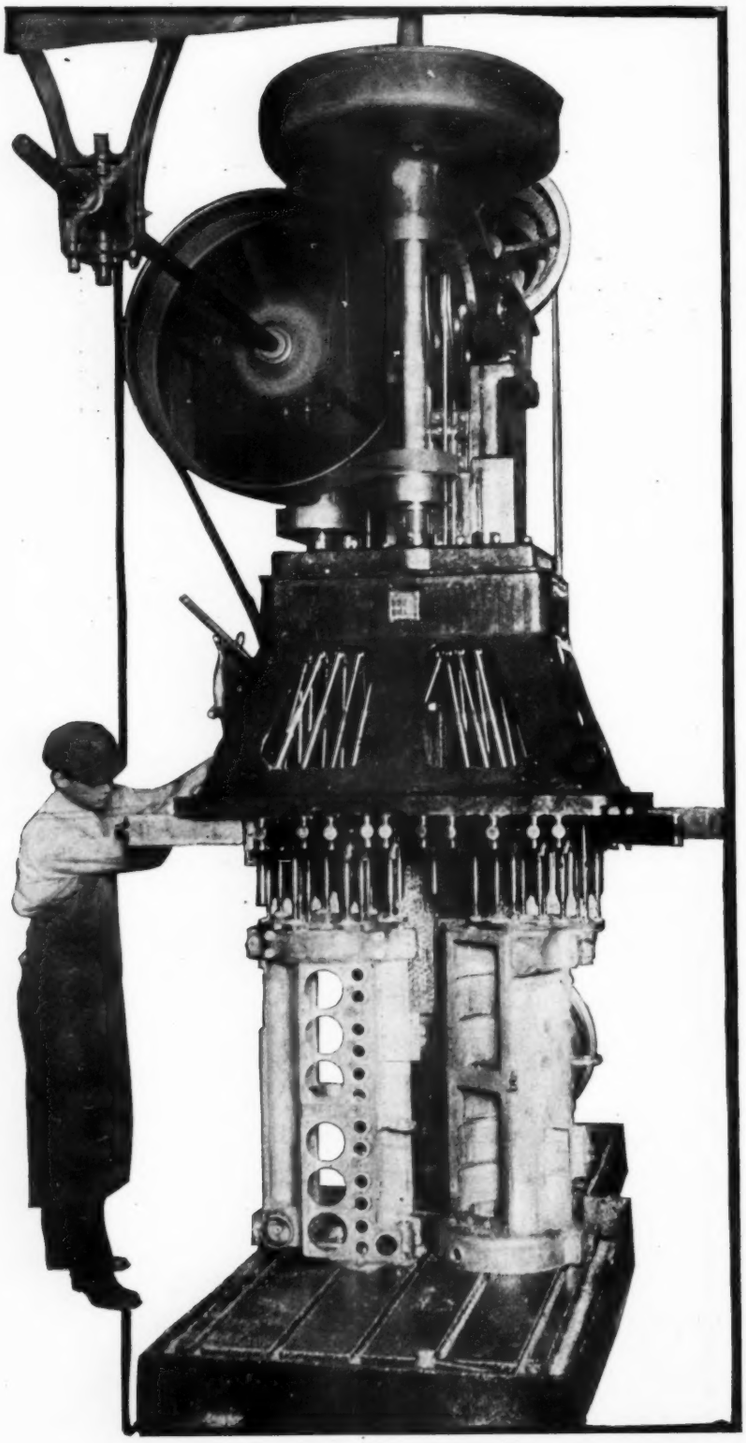


Fig. 4—Complete transverse section through the motor

Factory Miscellany



Giant multiple-spindle drill installed by the Chalmers Motor Company in its Detroit plant. The machine has thirty spindles and works on several crankcases. The drill is more than 12 feet high, including the driving and controlling mechanism

QUANTITY production is a much used expression these days, although but few realize the vast amount of ingenuity required to attain it. Nowhere is this shown better than in some of the tools that are used by the large manufacturers. The accompanying illustration depicts the multiple spindle drill recently installed by the Chalmers Motor Company, Detroit, Mich. It is one of the largest multiple-spindle drills ever built. The Chalmers company uses this machine to drill crankcases. Two crankcases can be operated upon at the same time. The machine in the illustration has twenty-seven spindles working simultaneously, while the total capacity of the machine is thirty spindles. An idea of the size of the machine may be obtained from the fact that the operator is 6 feet tall. Turning out two fully drilled crankcases every 15 minutes this machine can produce eighty finished crankcases per day. It takes but one man to handle it and the saving of time and money over the smaller machines is in the neighborhood of 25 per cent.

PATHFINDER'S FACTORY—The Motor Car Manufacturing Company, Indianapolis, Ind., maker of the Pathfinder car, expect to occupy about December 1 the new factory buildings now being completed in connection with the present Pathfinder plant in West Indianapolis. The accompanying illustration shows the addition under construction.

St. Louis Company's Plant—The St. Louis Tire & Rubber Company, St. Louis, Mo., has secured a site and will build a large factory.

Truck Company Building—The Toledo Motor Truck Company, Toledo, O., is erecting a one-story structural steel building, 54 feet by 236 feet.

Cutting Doubling Capacity—The Cutting Motor Car Company, Jackson, Mich., is making arrangements to double the size of its plant at Jackson.

Lamp Company Adds—The C. M. Hall Lamp Company, Detroit, Mich., maker of automobile lamps, is completing a large addition to its factory.

Three Shifts for Ford—The Ford Motor Company, Detroit, Mich., is considering the adoption of a three-shift day of 24 hours as a regular operating program.

Detroit Company's Factory—The American Auto Trimming Company, Detroit, Mich., has let a contract for a factory on Meldrum and Berlin avenues, that city.

Bulldog Tire May Build—The Bulldog Tire Company, Ltd., Toronto, Ont., has been organized to manufacture automobile tires. Plans for a factory are being considered.

Marathon Doubles Capacity—The Marathon Motor Company, Nashville, Tenn., which has a present capacity of thirty cars a week, is increasing its plant to double this capacity.

Batavia Company Adds—Work was begun this week on the addition to the Batavia Rubber Company's building, Batavia, N. Y., on Robertson street. The structure is to be of brick.

V-Ray Installing Machinery—The V-Ray Company, Marshalltown, Ia., maker of the V-Ray spark-plug, is installing new machinery and augmenting its force, in order to increase the 1913 output.

Nashville Chemical Plant—The Rex Chemical Company has moved its plant from Newport, Ky., to Nashville, Tenn. The Rex company manufactures metal polish and body polish for automobiles.

Chevrolet's $50,000 Plant—The Chevrolet Motor Company, Detroit, Mich., has secured a site at Flint, Mich., and contemplates the erection of $50,000 plant for the manufacture of automobile bodies.

White's Machine Shop—The White Automobile Company, Cleveland, O., has awarded the contract for the erection of a new one-story brick and steel machine shop, 160 feet by 240 feet, to cost $40,000.

Frame Company's Addition—The Parish Manufacturing Company, Detroit, Mich., has awarded the contract for the construction of a brick addition to its plant. The company makes automobile frames.

Sandusky Gets Addition—The completion of the addition to the new plant of the Sandusky Automobile Parts Company, Sandusky, O., manufacturer of trucks, will practically double the capacity of the institution. The new building will be used as an assembly and paint shop.

Lauth-Juergens Doubles Output—The Lauth-Juergens Auto Truck Company, Fremont, O., soon expects to double its present output of one truck a day. It will increase the output by having its engines made by outside parties.

Schultz Opens Factory—C. R. Schultz, inventor of a punctureless tire preparation, has opened a small factory at Harold, S. D., to manufacture his product, which he says does not interfere with the resiliency of tires.

Macomber's Plant—The Macomber Motor Company, Los Angeles, Cal., will erect a plant near Los Angeles for the manufacture of the Macomber gas engine for automobiles. Uri B. Curtis and W. G. Macomber are among the directors.

Auto Parts Company's Plant—Structural steel for the addition to the Auto Parts Company's plant, Pontiac, Mich., has arrived, so that the work of construction can be resumed. The foundations and cement floors have been completed and the steel work and roof will go up rapidly..

Will Build Truck—J. P. Cannon, of Detroit, Mich., has formed a concern to be known as the Cannon Motor Company, which announces that it will build an automobile factory in Des Moines, Iowa. According to the promoters they will from the first build a light truck and a roadster.

Amplex Doubling Capacity—The Amplex Motor Car Company, Mishawaka, Ind., is planning to double its factory capacity so that all parts of its cars will then be made at the Mishawaka factory, including aluminum bodies. The company will in a short time put on a larger force of workmen.

Citizens Want Factory—The citizens of St. Louis, Mo., have succeeded in raising $25,000 for a new automobile factory to be conducted under the management of W. H. Kilto & Son, of Toledo, O. Work on the factory will be started soon. The company will manufacture six-cylinder trucks and touring cars.

Garford's Warehouse—The Garford Company, of Elyria, O., is rushing the erection of a reinforced concrete storage warehouse, 85 feet by 210 feet. The building will house materials and parts, with one section devoted to finished car storage and loading dock. The new structure will add another unit to the big Garford plant.

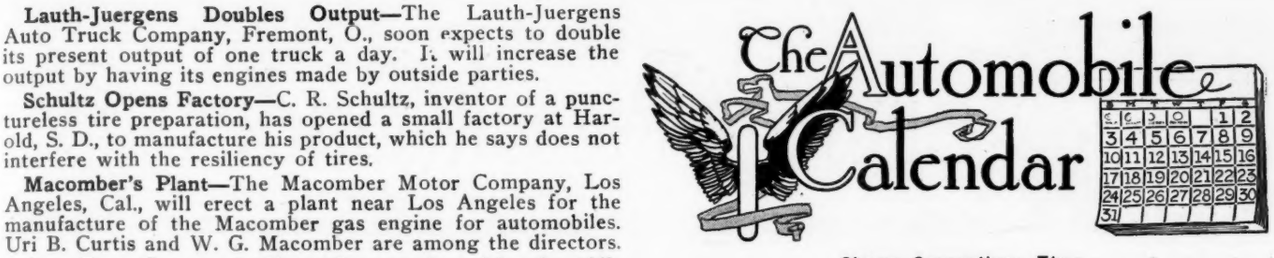
Renovating Kissel Plant—Work in renovating the recently-acquired auxiliary plant of the Kissel Motor Car Company, Milwaukee, Wis., is reported to be progressing rapidly, and it is expected that it will be ready for occupancy within 2 or 3 weeks. The improvements and additions to the Kissel plant at Hartford, Wis., are nearly completed and already partly in use.

Makes Ford's Tools—The Fox Typewriter Company, Grand Rapids, Mich., has closed a contract with the Ford Motor Car Company, Detroit, Mich., to furnish tools to that concern. Although the Ford company has a force of 100 tool makers in its own shops and 100 more outside it is unable to meet the demands of its 7,000 employees. The Fox company will put on fifteen additional tool makers for the contract.

Adds Workmen—The Wald Manufacturing Company, of Sheboygan, Wis., recently incorporated for $30,000, has increased its capacity and added a large number of workmen to its force. The company specializes in the manufacture of a tire tool, pedal grips, luggage carriers and mud guards. Considerable new equipment has been installed and a 4,000-pound stamping press and complete nickel-plating outfit purchased. The company formerly was known as The Wald Company.

Brown Erects Addition—The John W. Brown Manufacturing Company, located at Center avenue and West Broad street, Columbus, O., will soon award a contract for the erection of a large addition to its plant. The company has a contract to furnish the Ford company with all lamps for the season of 1913. The erection will be completed by January and will be the third large addition erected in the past year and a half.

Henderson Plant Busy—One of the busiest automobile plants in Indianapolis, Ind., is that of the Henderson Motor Car Company. Pending the occupancy of the new addition to its factory, which will be ready November 1, it has leased 13,000 square feet of space in the Industrial building at Tenth street and the Canal. The paint shop was moved from the factory the first of the week and all the painting will be done in the Industrial building until the busy season has passed. The floor in the present factory that housed the paint shop has been turned into a final assembly department.



Shows, Conventions, Etc.

Nov. 16-25	Atlanta, Ga., Annual Show, Auditorium-Armory, Atlanta Automobile and Accessory Association.
Jan. 2-10	New York City, Importers' Salon, Hotel Astor, Importers' Automobile Alliance.
Jan. 4-11	Cleveland, O., Annual Automobile Show.
Jan. 4-11	Montreal, Que., Montreal Motor Show, Drill Hall and 65th Regiment Armory.
Jan. 11-25	New York City, Thirteenth Annual Show, Madison Square Garden and Grand Central Palace, Automobile Board of Trade.
Jan. 20-25	Philadelphia, Pa., Annual Automobile Show.
Jan. 22-25	Geneva, N. Y., Annual Automobile Show.
Jan. 25-Feb. 1	Montreal, Que., Automobile Exhibition, R. M. Jaffray, Manager.
Jan. 27-Feb. 1	Buffalo, N. Y., Annual Automobile Show.
Jan. 27-Feb. 1	Detroit, Mich., Annual Automobile Show.
Jan. 27-Feb. 1	Scranton, Pa., Annual Automobile Show, Hugh B. Andrews.
Jan. 30-Feb. 1	Canandaigua, N. Y., Annual Automobile Show.
Feb. 1-8	Chicago, Ill., Annual Automobile Show.
Feb. 10-15	Chicago, Ill., Truck Show.
Feb. 10-15	Minneapolis, Minn., Annual Automobile Show.
Feb. 11-15	Ottawa, Ont., Annual Automobile Show.
Feb. 15-22	Newark, N. J., Annual Automobile Show, First Regiment Armory, New Jersey Automobile Exhibition Company.
Feb. 17-22	Kansas City, Kan., Annual Automobile Show.
Feb. 24-Mar. 1	Cincinnati, O., Annual Show, Music Hall, Cincinnati Automobile Dealers' Association.
Feb. 24-Mar. 1	Omaha, Neb., Annual Automobile Show.
March 3-8	Pittsburgh, Pa., Annual Automobile Show.
March 8-15	Boston, Mass., Annual Automobile Show.
March 19-26	Boston, Mass., Annual Truck Show.
March 24-29	Indianapolis, Ind., Annual Automobile Show.

Race Meets, Runs, Hill Climbs, Etc.

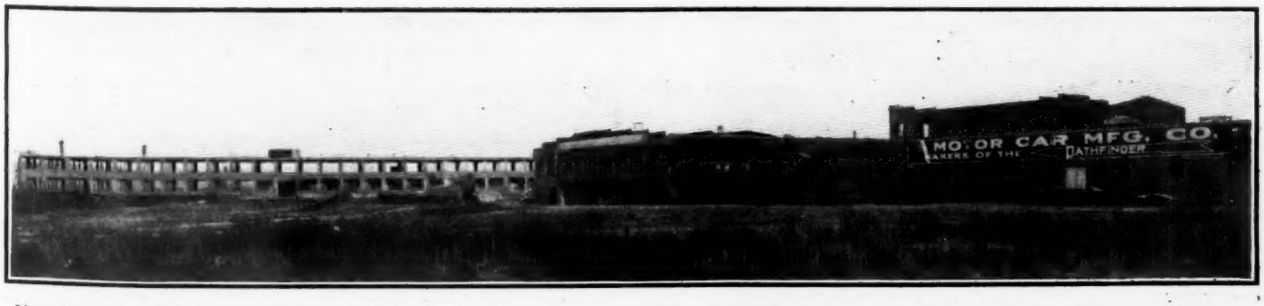
Nov. 29-30	Richmond, Va., Track Races, State Fair Grounds, Richmond Automobile Club.
May 30	Indianapolis, Ind., 500-Mile Race, Speedway.

Proposed Contests

Nov. 15	Hill Climb, Greenville, S. C., Automobile Club.
Nov. 16-17	Track, Sacramento, Cal., Barney Oldfield.
Nov. 23-24	Track, Fresno, Cal., Barney Oldfield.
Nov. 28-29	Track, Richmond, Va., Richmond Automobile Club.
Nov. 28	Road Race, Visalia, Cal., W. H. Lipton.

Foreign

Nov. 8-16	London, England, Olympia Automobile Show.
Dec. 7-22	Paris, France, Paris Automobile Show, Grand Palais.
Jan. 11-22	Brussels, Belgium, Annual Belgian Automobile Show, Centenary Palace.
March	France, Sealed Bonnet 3000-Mile Run.
April	Barcelona, Spain, International Exhibition.



New factory building in West Indianapolis, Ind., which will be occupied a fortnight hence by the Motor Car Manufacturing Company

Peerless 3-ton truck used by J. Sercombe, a landscape gardener of Toronto, Ont. He has found that the motor truck is practicable for use in fields and on soft ground

PEERLESS ON FARM—That the motor truck can successfully replace the horse for work in the fields and upon the soft ground has been demonstrated by J. Sercombe, of Toronto, Ont., a landscape gardener who has employed a 3-ton Peerless truck at such work with large profit to himself for several months. The accompanying photograph shows the truck in use.

Harris with Hupp—F. A. Harris has taken the position of assistant manager of the Hupp Motor Car Company, Detroit, Mich.

Guston with Velie—E. E. Guston, formerly with the Studebaker corporation, has accepted a position with the Velie Chicago, Ill., branch.

Longstreth Moves—The Longstreth Motor Car Company, Philadelphia, Pa., distributer of the Alco car, has moved to 2126 Market street, that city.

Menefee Anderson Manager—The Anderson Electric Car Company, Detroit, Mich., has appointed S. W. Menefee manager of its New York branch.

Buick in Savannah—The Buick Motor Company, Flint, Mich., has established a branch at Savannah, Ga., and has placed J. E. Finney in charge.

Shelton Branch Manager—T. B. Shelton has been appointed manager of the Fresno, Cal., branch of Don Lee, California distributor of the Cadillac.

Elliott District Manager—The Lippard-Stewart Motor Car Company, Buffalo, N. Y., has appointed J. R. Elliott district manager for Washington, Idaho and British Columbia.

Lu Lu Club's Run—Following out the idea successfully inaugurated last year, the Lu Lu Temple Automobile Club will conduct its second annual turkey run on Thanksgiving.

Ballou & Wright's Store—Ballou & Wright, Portland, Ore., are opening a branch store in Seattle, Wash., which will be in charge of A. H. Jones. They will handle automobile accessories.

Sievert with Grossman—L. J. Sievert, of Toronto, Can., has been engaged by the Emil Grossman Company, New York City, to act as the Canadian representative of that company.

Green Zero 40 Distributor—The A. Hazen Green Company, 1686 Broadway, New York, has been appointed New York City distributor for the Zero 40, a non-freezing fluid for use in radiators.

Combination Electric and Bulb Horn—Comprising a trumpet using one acoustic diaphragm in common with an electric sound exciter.

Large Tire Order—Backdahl & Company, of Stockholm, Sweden, have just contracted to supply 750 sets of United States tires for taxicab service in Norway, Sweden, Denmark and Finland.

Forsyth Sales Manager—R. L. Forsyth was recently secured as wholesale sales manager by the Thomas Flyer Company, which handles the Abbott-Detroit line at San Francisco, Cal.

Walz with McCullough—C. H. Walz has been appointed general manager of J. H. McCullough & Son, dealers in automobile supplies and accessories, 219 North Broad street, Philadelphia, Pa.

Germany Industry Statistics—The German automobile industry shows a steady and material growth. In 1909 and 1911 the German aggregate exports were, respectively, 19,983,000 marks and 49,013,000 marks.

Holly Kelly Manager—A. S. Holly, former manager of the truck department of the Packard company, Detroit, Mich., has been made manager of the New York branch of the Kelly Motor Truck Company.

Parker Represents Pathfinder—Frank R. Parker, of Boston, Mass., is now New England representative of the Motor Car Manufacturing Company of Indianapolis, Ind., maker of the Pathfinder pleasure and commercial cars.

Elmer Leaves Grant—Of interest to the automobile industry in general is the recent resignation of Harry H. Elmer as director and general manager of the Grant Motor Car Company and the Grant-Lees Machine Company, both of Cleveland, O.

Smith in Advertising Firm—Harold Smith has given up his position as advertising manager of the General Motors Truck Company, Pontiac, Mich., entering the Carl M. Green advertising agency, from which concern the advertising of the truck company will be handled in the future.

New Agencies Established During the Week

PLEASURE CARS

Place	Car	Agent
Allentown, Pa.	Franklin	Luchenback Bros.
Arcato, Cal.	Cole	J. P. Rusthei
Atlantic City, N. J.	Cole	W. B. Thompson
Baltimore, Md.	Abbott-Detroit	Detroiter-Baltimore Co.
Baltimore, Md.	Henderson	Henderson M. Sales Co.
Baltimore, Md.	Havers	Charter Auto Co.
Baltimore, Md.	Norwalk	O. E. Williamson
Bridgeport, Conn.	Kline Kar	D. & H. Auto. Dis. Co.
Buffalo, N. Y.	Kline	Windsor M. C. Co.
Charleston, Mo.	Moon	Luke Howlett
Cincinnati, O.	Havers	F. H. Berold
Cleveland, O.	Ohio	H. E. Riker & Co.
Columbia, Pa.	Mitchell	Columbia Auto Co.
Columbus, O.	Moon	Murnan Taxicab Co.
Columbus, O.	Studebaker	Twyman M. Co.
Columbus, O.	Warren-Detroit	Warren Sales Co.
Des Moines, Ia.	Moon	Van Vliet-Bradt M. Co.
Elyria, O.	Havers	H. M. Andress & Co.
Franklin, Pa.	Kline	King Auto. Co.
Hammond, N. Y.	Franklin	D. E. Coats
Hannibal, Mo.	Moon	Long Mfg. Co.
Hartford City, Ind.	Cole	A. W. Tindall
Lima, O.	Ford	McLeod & Barr Auto Sales Co.
Lowell, Mass.	Rambler	Joseph Marin
Marcus, Ia.	Moon	Johnson, Petty & Johnson
Melrose, Mass.	Overland	Smith Bros. Garage Co.
Memphis, Tenn.	Buick	Tennessee Motor Co.
Memphis, Tenn.	Stearns	V. L. Gorges
New Haven, Conn.	Moon	J. J. Laverty
New York City	Kline Kar	Gildel Auto. Co.
Norfolk, Va.	Cole	C. L. Young
Orange City, Ia.	Moon	Aerrote Van De Wilt
Providence, R. I.	Henderson	J. B. Higginson
Reno, Nev.	Cole	Reo Nevada Co.
Richmond, Va.	Overland	W. D. Sapp
Rochester, N. Y.	Havers	Beardsley & Gallagher
San Francisco, Cal.	Arbenz	L. S. Johnson
Suffolk, Va.	Cole	B. E. Parker
Springfield, Mass.	Chevrolet	Bunker-Reopwell Co.
Springfield, Mass.	Little	Bunker-Reopwell Co.
Syracuse, N. Y.	Metz	J. M. Watkins
Springfield, Mass.	Rambler	Bunker-Reopwell Co.
Toledo, O.	Flanders	Landman & Griffith
Toledo, O.	Moon	Moon Sales Co.
Vancouver, B. C.	Havers	A. S. French Auto Co.
Wakefield, Nebr.	Moon	Utecht & Eimer
Wall Lake, Ia.	Moon	Hopkins & Herrig
West Point, Nebr.	Cole	Hirkow & Ickman
Yankton, S. D.	Moon	F. J. Nyberg

COMMERCIAL CARS

Anaheim, Cal.	Federal	P. J. Weisel & Co.
Dallas, Tex.	Federal	Pence Auto Co.
Eugene, Ore.	Federal	J. S. Airheart.
Fall River, Mass.	Federal	Brownell & Burt.
Ft. Wayne, Ind.	Federal	M. N. Plumadore.
Hartford, Conn.	Federal	R. D. & C. O. Britton Co.
Lawrence, Mass.	Federal	W. H. Baxter.
Pasadena, Cal.	Federal	Monroe Motor Co.
Pendleton, Ore.	Federal	M. K. King.
Pittsburgh, Pa.	Federal	Union Motor Car Co.
Seattle, Wash.	Federal	Pacific Car Co.
St. Paul, Minn.	Federal	Smith Bros.
Tillamook, Ore.	Federal	A. H. Harris.
Victoria, Tex.	Federal	Texas Motor Car & Supply Co
Wilmington, Del.	Federal	Pennsylvania, Pa.

Fenner Branch Manager—D. C. Fenner was appointed New York branch manager of the International Motor Company recently.

Waite with Paterson—G. S. Waite has been engaged as sales manager of the W. A. Paterson Company, Flint, Mich., manufacturers of the Paterson line of cars.

Sugden Leaves Thomas—J. L. Sugden has resigned from the E. R. Thomas Company, Buffalo, N. Y., and has joined the Lord & Thomas Advertising Company, Chicago, Ill.

New Frisco Quarters—The Carl Christensen Motor Car Company, San Francisco, Cal., distributers of the Detroiter, has taken new quarters at 561-567 Golden Gate avenue.

Jacoby with Pullman—C. W. Jacoby has resigned the position of eastern sales manager of the Standard Electric Company, to assume the general sales management of the Pullman Motor Car Company, York, Pa.

Conklin Joins Remy—O. F. Conklin has become associated with the Remy Electric Company, Anderson, Ind., in the capacity of consulting engineer of the Remy electrical starting device for application to automobile engines.

Kempton Remy Manager—P. E. Kempton of San Francisco, Cal., has been appointed manager of the San Francisco Remy branch to succeed A. J. Rogers, who becomes manager of the New York branch to succeed F. M. Henkel, resigned.

Smith Production Manager—C. D. Smith has been appointed production manager of the Winton Motor Car Company, Cleveland, O. W. H. Doddridge succeeds Mr. Smith as manager of the company's repair and service departments.

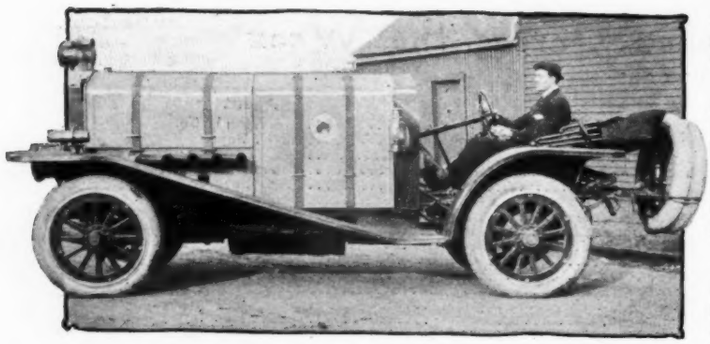
Organizes Engineering Agency—H. L. Croy, formerly mechanical engineer of the Woods Motor Vehicle Company, Chicago, Ill., has organized the Toledo Engineering Agency, Toledo, O. The agency will handle high grade positions in all the engineering fields.

Age Limit Eighteen—No one who is under 18 years of age may operate an automobile in the state of Maryland, even though accompanied by his or her parents, who may be duly licensed, according to an opinion delivered by Judge Frank I. Duncan, in the Circuit Court at Townson, Md.

New Cincinnati Law—Chief of Police Capelan of Cincinnati, O., has just issued an order which forbids automobile owners to leave their cars standing for more than 5 minutes in the district bounded by Elm on the west, Main on the east, and between Fourth and Sixth avenues. The rule applies to all other vehicles.

Columbus Road Doings—At the annual meeting of the Ohio Good Roads Federation, held in Columbus, O., recently, strong resolutions were adopted pledging the members to continue the fight despite the fact that the proposed amendment to the Ohio constitution was defeated at the polls. A number of different plans of action were discussed, and it seemed to be the feeling that the best scheme was to go before the Ohio General Assembly and ask for a direct levy for road purposes.

Exterior and interior views of the new De Dion ambulance recently delivered to the Government of the Philippine Islands. The chassis equipped with a 25-horsepower, four-cylinder motor, giving the car a speed of 30 miles an hour. It is fitted with an air-cushion shock-absorber. Inside the body, which was made by the DuPont Company of Paris, there are two stretchers with an apparatus for hot and cold water and a complete medicine chest. The stretchers may be removed and patrol wagon seats fitted. The apparatus is to be used in Manila and vicinity.



Special racing car built by S. P. Blackiston, of Canton, O. Among the unique features of the car are the two radiators, mirrors arranged for driver to see past the high hood, universal joint on the steering column which is so heavy that it takes two men to lift it and a powerful electric searchlight which illuminates the road for .25 mile

Fire Engine Arrives—The first of the three motor-driven fire engines that were recently ordered by Nashville, Tenn., has arrived.

Baltimore, Md.—Because of increased business the Oakland Motor Car Company, Baltimore, Md., has leased the large warehouse at Biddle Park and Howard street.

Pennsylvania's Road Repairing—The Pennsylvania State Highway Department has repaired approximately 6,000 miles of main state highways, or about 75 per cent. since the department took over the 296 routes covered by the Sproul highway law June 1 last.

Garage Capacity Doubled—Jones & Indra, 149-151 North Broadway, Green Bay, Wis., who erected a large new garage a year ago, have started work on an addition which will double the capacity. Part of the new building will be devoted to repairs and reconstruction.

Fireproof Garage Built—A large new garage is being erected by John L. Snyder on Third street, Newport, Pa. The building will be fireproof, built of cement blocks, with cement floor and steel roof. The Perry Concrete Company has the contract for the erection of the garage.

Overland in Phoenix—Phoenix, Ariz., men have incorporated the Overland Auto Company and opened a new garage on Third avenue. Overland machines are handled exclusively. It has been several years since the Overland was represented in Phoenix. A. S. Earhart is manager of the new company.

Erect Hartford Garage—Charles H. Lohr and Howard Danielson have leased the Hacker, Hartford, Wis., building and remodeled it into a garage and repair shop. The firm has the district agency for the Ford in Dodge and Washington counties. Mr. Danielson has been associated with the factory of the Kissel Motor Car Company at Hartford for several years.

Ohio Plans Two New Laws—The Ohio state association of automobile owners is laying plans to secure two new laws which it is hoped to have enacted at the meeting of the Legislature next winter, which will have a far-reaching effect and which will be of special interest to all owners of motor cars. One of the desired laws will make it a penitentiary offense to steal an automobile.

Beloit Satisfied with Truck—The Common Council of Beloit, Wis., is arranging for the provision of funds in the new budget for the purchase of another combination hose, chemical and squadron motor truck. The Council is enthusiastic over the results obtained from the present motor-driven fire apparatus and has found it to be cheaper to maintain motor-driven apparatus than that pulled by horses.

Wants Better Laws—The Automobile Club of Maryland has started a vigorous campaign for a more sane and just motor vehicle law. With this object in view the club has communicated to each of the 1,000 members to lend their individual help to take before the Legislature of 1913 a sane, just and fair motor vehicle law. Another thing the club will ask the next Legislature is to give reciprocal relations with the motorists of the District of Columbia.

St. Louis Maxwell Changes—In the future the Maxwell line will be handled in St. Louis, Mo., by an agency instead of a branch house as in the past. The agency will be known as the Maxwell Motor Sales Company and will occupy the quarters formerly occupied by the branch house. B. R. Ford will be at the head of the new agency. Frank R. Tate, formerly manager of the branch house, has made connections with the Ford Motor Company.

Omaha Plans Show—The regular annual meeting of the stockholders of the Omaha, Neb., Automobile Show Association was held on Tuesday, October 29. The coming automobile show, from February 24 to March 1, was the topic most generally discussed. It was decided that the expenditures for decorations, lights and other necessities will be materially increased this year, thereby making this year's show the biggest and best that has ever been held in Omaha.

Governs Vehicle Use—The Common Council of Manitowoc, Wis., has passed an ordinance governing the use of vehicles on city streets. The ordinance embodies all of the well-known rules of the road, but adds a provision obliging motorists to use a silencer or muffler and refrain from unnecessary use of gongs, bells, horns or signals of any kind. The Milwaukee ordinance is copied in that it requires drivers of all self-driven vehicles to stop behind any street car which is taking on or discharging passengers.

Wants Fire Truck Estimates—The common council of Beloit, Wis., has authorized the committee on fire and police to begin negotiating for the purchase of a second combination hose, chemical and flying squadron motor truck. The first has now been in use 17 months and shows so large a saving that at this time, when more equipment and apparatus is made imperative, and the choice lay between horses and motor-propelled vehicles, the motor was unanimously chosen. The committee will receive estimates from manufacturers at once.

Club Established Quickly—San Jose, Cal., has established something like a record in the quick organization of a motor club. At the beginning of the present month a number of enthusiasts decided that the Garden City ought to have an automobile organization and a club house. Promptly they got together and organized a country club. Within the next 2 weeks they secured a membership of 275, raised $45,000 in actual cash, bought 90 acres of foothill land near Alum Rock Park, and let a contract for the erection of a handsome clubhouse and the laying out of extensive golf links. There will also be a large and elaborate garage.

Indiana Club Plans—Members of the Indiana Automobile Manufacturers Association, Indianapolis, Ind., will send their exhibits to the New York show in January by special train. This was decided upon at a meeting of the association held in Indianapolis on the evening of October 31. A New York show committee to arrange the plans for the train and for exhibiting at the show was appointed, as follows: J. Guy Monahan, of the Premier Motor Mfg. Company; Harold Hyde, of the Empire Motor Car Company; William Esterly, Firestone Tire Company. Another meeting of the association will be held in Indianapolis on the evening of November 21 to discuss the proposed run to be made to the Pacific coast next summer.

Automobile Incorporations

AUTOMOBILES AND PARTS

BOSTON, MASS.—Eliot Motor Car Company; capital, $250,000; to deal in automobiles. Incorporators: Roscoe G. Houston, Wm. D. Wallace.

CLEVELAND, O.—Lozier Sales Company; capital, $30,000; to deal in automobiles and accessories. Incorporators: W. H. Miller, A. H. Weaver, W. B. Anderson, V. C. Erman, J. H. Brown.

FARMINGTON, ME.—Metcalf Automobile Company; capital, $10,000; to deal in automobiles. Incorporators: J. C. Metcalf, John G. Morton, H. W. Barker.

LOUISVILLE, KY.—Rommel Motor Car Company; capital, $15,000; to deal in automobiles. Incorporators: John Rommel, H. E. Rommel, Joseph H. Kaltenbach.

NEW YORK CITY.—Beaver State Motor Company; capital, $300,000; to manufacture automobiles. Incorporators: P. Combs, J. L. Bailey, J. A. Johnson.

NEW YORK CITY, N. Y.—Miller-Brisben Company, Inc.; capital, $25,000; to deal in automobiles, etc. Incorporators: Irving Jaffee, John McNeil Brisben.

NEW YORK CITY, N. Y.—Peets-Homan Corporation; capital, $2,000; to manufacture and sell all kinds of motors, engines, etc. Incorporators: John A. Bolles, Clifford S. Peets, Frank D. Homan.

NEW ORLEANS, LA.—J. A. Landry Motor Car Company; capital, $25,000; to manufacture automobiles. Incorporators: J. A. Landry, J. B. Avergo, Roger J. Montrose.

TROY, N. Y.—Automobile Salvage Corporation; capital, $2,000; to deal in second hand automobiles. Incorporators: Michael Kennedy, Theodore P. Low, Mark F. Nichols.

WASHINGTON, D. C.—Michigan Motor Company; capital, $10,000; to manufacture automobiles. Incorporators: T. Oliver Probey, J. H. Stuart, George R. Stuart, F. C. Sibbald, E. G. Powell.

GARAGES AND ACCESSORIES

BOSTON, MASS.—Amherst Garage Company; capital, $15,000; to conduct a general garage business. Incorporators: Henry E. Paige, Louis E. Smith, Charles H. Buell.

Five Heinz Trucks Sold—The H. J. Heinz Company has just closed an order for five 3.5-ton G. V. trucks.

New Orleans Uses Sprinkler—A new motor-driven sprinkling wagon has been put in service by the municipal authorities of New Orleans.

Posts Road Signs—The Owego, N. Y., automobile club has just completed its campaign of posting signs on various roads leading to that town.

Gotshall Manages Lozier—N. S. Gotshall, western traveling representative of the Lozier Motor Company, Detroit, Mich., has severed his connection with the Lozier Motor Company to accept the management of the St. Louis Lozier Company.

Luce Leaves Velie—Morton H. Luce, manager of the Chicago, Ill., Velie branch, has resigned that position to become sales manager for the American and Marion Sales Company, New York City.

Set Utica Show Date—December 15 has been set as the day for the annual convention of the New York State Automobile Association, which will be held this year in the Hotel Utica, Utica, N. Y.

Evans Leaves Lozier—J. M. Evans, who for the past year has occupied the position of advertising manager of the Lozier Company, Detroit, Mich., has severed his connection with the Lozier interests.

Gramm Goes to Cuba—Cuba has been found a profitable field of endeavor by the Gramm Motor Truck Company of Lima, O., and contracts were recently signed for the delivery of a half dozen cars to Havana.

Kelly in Seattle—Factory distributing headquarters for the states of Washington, Oregon, California, Idaho and Montana and the province of British Columbia for Kelly motor trucks have been located in Seattle.

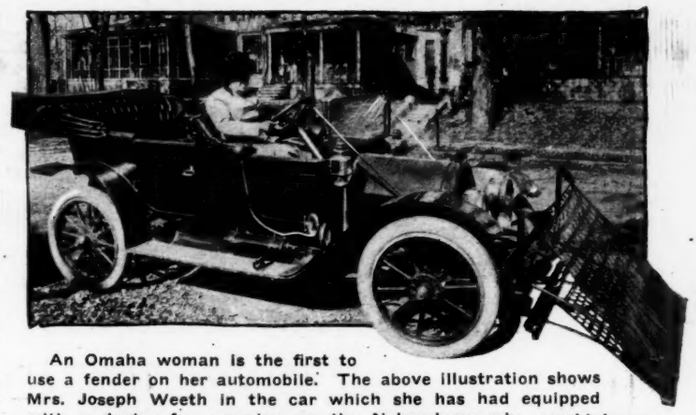
New Oldsmobile Quarters Ready—The new quarters for the Oldsmobile Company on Broad street near Bacon avenue, Providence, R. I., are practically completed, and the company will occupy them in a few days.

Appoint New Manager—B. F. Morris has been appointed manager of the local factory branch of the Republic Rubber Company, of Youngstown, O., which recently took over the interests of the Bison Rubber Company.

Schonacker Leaves Marvel—A. G. Schonacker, general manager of the Marvel Carbureter Company, Flint, Mich., has resigned his position on account of his condition of health, and expects to locate in the West.

Sugden Leaves Thomas—J. L. Sugden, formerly connected with advertising section of the E. R. Thomas Motor Car Company has severed his connection with that concern and is now with Lord & Thomas, of Chicago.

Montreal Supplies Cars—It was resolved by the Montreal Que., Board of Control recently to accede to the request of the three section superintendents of the roads department to supply them with small automobiles costing $2,000 each.



An Omaha woman is the first to use a fender on her automobile. The above illustration shows Mrs. Joseph Weeth in the car which she has had equipped with a device for scooping up the Nebraskans who would have otherwise been crushed beneath the wheels of the car

Richardson a Manager—Malcolm B. Richardson, formerly with the Remy Magneto Company, has been appointed district sales manager in the Southern territory for the Franklin Automobile Company. He will make his headquarters at Atlanta, Ga.

Davis in the Field—A. H. Davis, formerly with the Rochester branch of the Franklin Automobile Company and later engaged in selling motor cars in Buffalo, has rejoined the staff of the Franklin Automobile Company and will act as a special field representative.

Fix Age Limit—The city codifying commission of Dayton, O., is planning an action which will exclude boys and girls under 18 years from operating automobiles. There is also some talk of barring women from driving gasoline cars. The matter is now up to the city council.

Ohio's Road Figures—Figures compiled by State Highway Commissioner James Marker show that Ohio has so far this year contracted for the construction of more than 150 miles of road. Between now and January 1 contracts will be let for the construction of about 25 more miles.

To Handle Paige—The combining of the Carpenter Motor Sales Company and the Thomas Motor Car Company, of Los Angeles, Cal., was accomplished last week. New quarters have been secured at Eleventh and Flower streets. This company will distribute the Paige car in California.

Jacobs Goes Into Bankruptcy—Volney J. Jacobs, who has represented various makes of cars in Boston, Mass., for the past few years, has filed a petition in bankruptcy. His liabilities amount to $19,483, of which $13,572 is secured, and there is due about 80 creditors $5,892. His assets are given as $50.

Piggins in Frisco—A branch of the Piggins Motor Truck Company, of Racine, Wis., has been established in San Francisco to serve as a distributing depot for the entire West, Hawaii and the Orient. J. I. McLaughlin is manager. Besides the Piggin truck the Inter-State pleasure cars will be handled.

Railroads Too Slow—The Willys-Overland Company, Toledo, O., has had considerable trouble in shipping its cars to its dealers, due to the inability of the railroads to supply cars for transportation. The dealers have solved the question by going to the factory and driving the cars to the customers.

Responsible for Employee's Injuries—An automobile owner who requires an employee to ride with him in his automobile must be responsible for injuries that may result from such a ride, according to the Supreme Court of Minnesota. A. H. Patterson, chauffeur, received a $4,500 verdict in the lower court. The award is sustained. While driving fast the owner, who was in the car, the machine turned turtle and injuries resulted to the chauffeur.

Novel Use for Motor Truck—Unique among the varied uses the motor vehicle has been put to is the work L. S. Davidson, of Portland, Ore., has applied his 1-ton Little Giant truck. Equipped with a complete motion-picture outfit, the power wagon was piloted out of the city recently to visit towns where electric lights are not used. With the power from the gasoline motor, a 110-volt dynamo generated enough electricity to run the moving picture outfit and one arc light. His equipment weighs 1,500 and the truck is rated at 25 horsepower.

Automobile Incorporations

BROOKLYN, N. Y.—Brooklyn Auto Top & Supply Company; capital, $5,000; to manufacture automobile tops and accessories. Incorporators: Beatrice H. Marron, Jacob Seigel, Edgar E. Chinnock, Jr.

BROOKLYN, N. Y.—H. J. & S., Inc.; capital, $1,000; to manufacture and deal in rubber, rubber articles, etc. Incorporators: Joseph Mattison, Harry Jacobson, Siegfried Glass.

BROOKLYN, N. Y.—Sea Gate Garage & Automobile Corporation; capital, $2,000; to conduct a general garage business. Incorporators: Joseph F. Curtin, H. O. Coughlan, Thomas K. Mallaby.

CHICAGO, ILL. Auto Combination Lock Company; capital, $50,000; to manufacture nut locks and supplies. Incorporators: Howard L. Mason, Harry W. Snow, Francis W. Robinson, William J. Liddy.

CHICAGO, ILL.—Michigan Avenue Garage Company; capital, $5,000; to carry on a general automobile livery business. Incorporators: Edward L. Richter, James D. Donnell, A. J. Moran.

CHICAGO, ILL.—National Oil Gas Generator Company; capital, $5,000; to manufacture and deal in carbureters, generators, metal goods, etc. Incorporators: Walter D. Hawk, Samuel S. Holmes, George E. Dierssen.

NEW YORK CITY, N. Y.—Cahill Auto Works; capital, $6,000; to conduct an automobile repair shop. Incorporators: Andrew J. Cahill, Charles E. Trainor.

NEW YORK CITY, N. Y.—Seager's Garage, Inc.; capital, $1,000; to conduct a general garage business. Incorporators: James H. Seager, Albert Seeley, Henry B. Ecerson.

NEW YORK CITY, N. Y.—Tuxedo Tire Company; capital, $8,000; to manufacture tires. Incorporators: Augusta Hormann, Emilie Waltenberg, Adolph Waltenberg.

CHANGES OF NAME AND CAPITAL

CINCINNATI, O.—Price Hill Garage & Auto Company; increase of capital from $1,000 to $100,000.

DETROIT, MICH. Warren Motor Car Company; increase of capital from $300,000 to $600,000.

MARSHALLTOWN, IA.—Marshalltown Motor Material Manufacturing Company; change of name to V-Ray Company, Inc.

Champion Priming Spark Plug; Brolt Lighting Generator; J. H. Windshield for Tonneau Passengers; Gilmer Pliers and Cleaning-Tool; New Electric Horn; Automobile Turntable for Garage Use

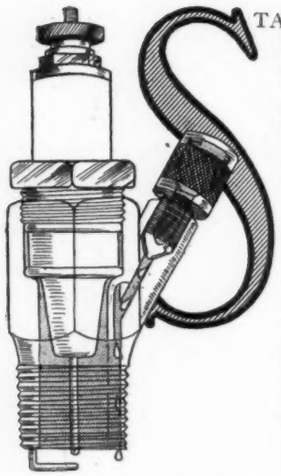


Fig. 1—New Champion priming spark-plug

STARTER plugs which combine the office of sparking with that of a priming cup have become fairly common during the last year, a number of these devices having been announced. It stands to reason that the principal problem in the construction of such a plug is to obtain absolute tightness of the various parts, so that the provision of a priming cup does not bring with it a leak of compression when the engine is in operation. In the Champion priming plug, Fig. 1, this end has been realized by using for the priming cup a brass plug bored as shown, through which the gasoline injected for starting enters; out of the central bore of the cup, the fuel runs down toward the wall of the bored shell in which the cup is fitted. The upper portion of the brass cup is screw-threaded to fit into the steel extension of the sheel, while the lower end is formed as a plain needle which, when screwed down upon its seat, makes a close fit with it. As the engine heats up, the brass cup expands to a greater extent than the steel bore in which it is in position, a tight fit being obtained in this way. The ghost view, Fig. 1, illustrates the simplicity of the construction of this plug, which is composed of very few parts; the latter are manufactured in a standard way and therefore interchangeable. The Champion Spark Plug Company, 132 Upton avenue, Toledo, O., is the maker of this plug. This spark-plug is manufactured in the regular sizes, and may be used without in any way altering the gas and wiring connections to the various cylinders, as compared with other plugs. It must be remembered, however, that the brass cup is designed for priming with liquid fuel only and not for the admission of acetylene.

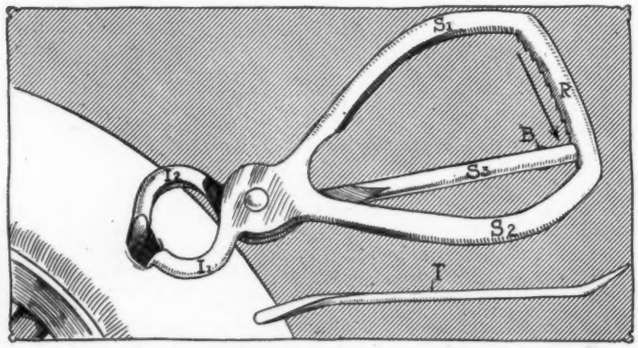


Fig. 2—Gilmer improved repair pliers and cleaning tool

Brolt Electric Lighting Generator

Among the new lighting systems which have made their appearance on the other side is the electric generator outfit sold under the name Brolt by the Brown Brothers Limited, Great Eastern street, London, E. C. This generator is designed to give a constant current output, the regulation being obtained by the use of purely electrical means. Figs. 6 and 7 show the principle on which the device operates. The dynamo is constructed with two main poles N and S which are excited by a shunt winding connected to the brushes, while auxiliary poles N1 and S1 are not wound, but are excited by the cross-magnetization due to the current in the armature. Fig. 7 shows the brushes B which are in a neutral position respective to the main poles and which short-circuit several armature coils during the period of commutation, as shown by the black dots in Fig. 6. When the armature revolves, a voltage induced between the brushes causes current to be delivered to the battery. The armature current induces a cross-magnetizing flux in the poles N1 and S1 which are provided to receive the same. The armature coils short-circuited by the brushes cut the cross flux, and a short-circuit current is induced in them proportionate to the speed of the armature and the cross flux, and tending to demagnetize the main poles. Thereby the main field is demagnetized in just the same degree as the output tends to increase, the latter thereby being kept constant. The dynamo is constructed for sparkless operation and ordinary brushes are used; the generator runs at a speed 1.5 times that of the engine. The generator requires lubrication about as frequently as the magneto, and medium heavy oil is filled in the dynamo bearing cups O. Positive and negative terminals are shown at P and N, respectively, in Fig. 7.

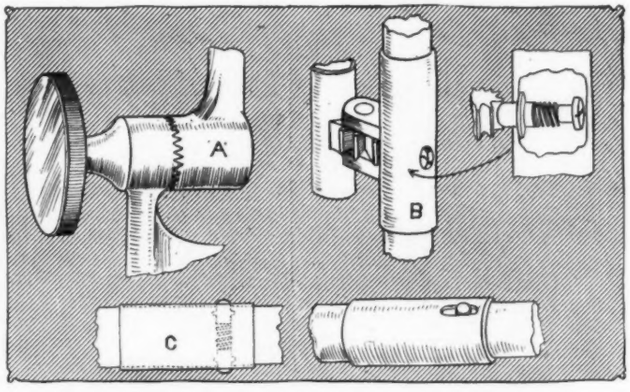


Fig. 3—Details of J. H. tonneau windshield mechanism

J. H. Tonneau Windshield

The protection of the passengers of a tonneau from the wind, when the driver's shield is not up, is the purpose of the J. H. shield, Fig. 4, which is made by the J. H. Tonneau Windshield Company, 225 West Forty-ninth street, New York City. This figure shows how the shield is carried on two rods the ends of which are hinged to the rear of the driver's seat and on which the tonneau shield proper is slidable. The shield consists of three sections, the central one being of glass and the lateral ones of celluloid, and all are carried in wooden frames of circular section. The whole shield may be turned to any angle, relative to the horizontal, around the lower edge of the central portion, a fulcrum being formed by the two members holding it to the horizontal rods, shown at A, Fig. 3. The angle of the side portions against the central piece is also variable, the shield section being able of remaining in any desired position relative to the central one, by the use of the dog hinges B, Fig. 3. The details of these parts are so clearly illustrated that no explanation is necessary; A consists of two jaw clutches capable of facial en-

gagement and B of a spring-pressed pin which drops into the gear pivoted between the two shield-section frames. C, Fig. 3, serves for keeping the shield in place when it is not in use. The parts A are carried by sleeves sliding on the horizontal rods fixed to the driver's seat; these sleeves are slotted and permit the spring-separated plungers, which are located near the point where the rods are fastened to the body, to drop into them. The sliding fit of the sleeves on the rods permits of pushing either side of the shield toward the driver's seat, when a passenger wants to leave the car on either side. A waterproof curtain shielding the passengers' feet against rain depends from the lower edge of the middle section of the shield.

Mineral Anti-Freezing Water

Now that the cold season is drawing near, various companies prepare anti-freezing solutions for the use of the automobilists. A different course is being adopted by the Automobile Equipment Company, 225 Jefferson avenue, Detroit, Mich., which sells what is called Natural Mineral water for the radiator. This solution is added to the radiator water as the latter is evaporated and does not freeze above a temperature of 40 degrees below zero.

Gilmer Improved Repair Pliers

G. Walker Gilmer, Jr., 51 North Seventh street, Philadelphia, Pa., has just brought out a new and improved type of his tire repair pliers which come in very handy in the making of speedy cures on tire casings. Since it is necessary for the efficacy of a cement repair on a casing, that the wound be absolutely clean before the cement is applied, lest the fabric rots, the pliers have been so designed that by their use the wound of the casing may be spread sufficiently wide to permit of thorough cleaning of it. The pliers sonsists of a triangular shank which carries at one end the jaw I1, Fig. 2, while pivoted to it is the shank S3 which

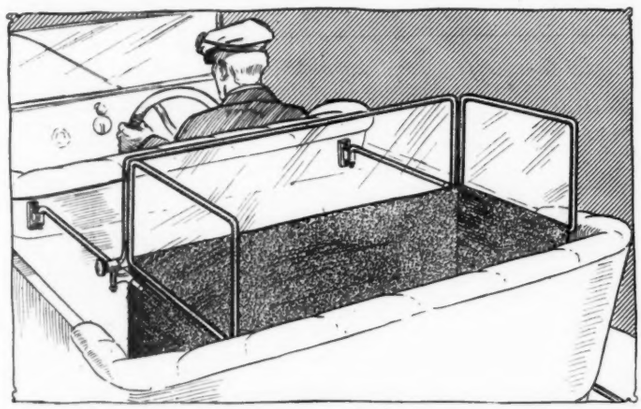
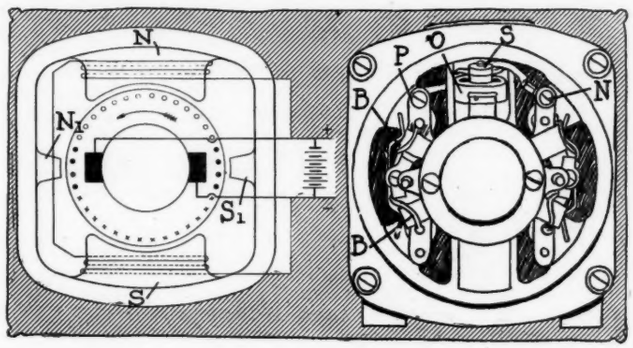


Fig. 4—J. H. tonneau windshield in place on touring car

is formed with a jaw I2. The triangular shank consists of two side-members S1 and S2 which are held together by a rack-shaped connecting piece R, all being made of one piece of metal. A rod pivoted in the under side of S3 drops into the teeth of the rack, as S3 is moved in the direction indicated by the arrow, so that two jaws may be held in any relative position within the their limit of movement. To release the hold of the jaws, the button B is pressed toward S3, whereby the hold of the inner rod of this shank on the rack R is relieved. The shape of the jaws is clearly seen in the illustration, as in the form of the cleaning tool, which serves for the removal of foreign matter out of the wound. The pointed end of the tool serves for this purpose, while the flat end is designed for the pressing of the repair cement into the wound. The entire outfit is nicely finished in nickel.

Holtzer-Cabot Electric Horn

Another electric-vibrator horn has made its appearance on the market of Holtzer-Cabot Electric Company, Brookline, Mass. Fig. 5 shows this product, which operates on the same principle which has been repeatedly described in connection with various



Figs. 6 and 7—Details of Brolt car-lighting dynamo

vibrator horns shown in these pages of late. A vibrator coil C and an armature A serve for actuating the acoustic diaphragm D, the vibration of which produces the signaling sound. The coil is mounted on a base B insulated from the other metal parts of the horn, and the armature which has a flat steel-spring part permitting it if reciprocating toward and away from the coil, serves as current breaker between the screw S and the metal casing C, through which the current returns to the battery. A push-button is used for actuating the horn.

Portland Automobile Turntable

Garage owners should find the automobile turntable made by the Portland Garage Company, Portland, Me., of interest. This table, Fig. 8, is distinguished by the cantilever principle applied in its construction, as well as by the ease of installing it in a garage. The table plate is carried by a cylindrical drum, which is concentrically mounted on a center pin, being carried by a baseplate mounted in the same manner, but resting upon the foundation. The table plate, which is of 10.25-inch steel, has a cast-iron center and its periphery runs within an outside ring, a clearance of .25 inch being provided between it and the ring. As the weight of the turntable does not rest on the central pivot itself, the latter permits of easy rotation of the table, and a minimum of friction is insured by the use of case-hardened rollers which run on the base carrying the weight of the table. The table may be installed in either of two ways, depending upon whether it is put on the ground floor or not. If there is a floor below that on which the table is placed, the latter must be set upon I-beams resting on the floor; whereas, when the ground floor is used, a single I-beam is buried and cemented in the ground, and the table placed upon it. This turntable is made in four sizes, having 10, 12, 13.5 and 15 inches diameter respectively, and having a maximum capacity of 106, 132, 151, 171-inch wheelbase cars respectively.

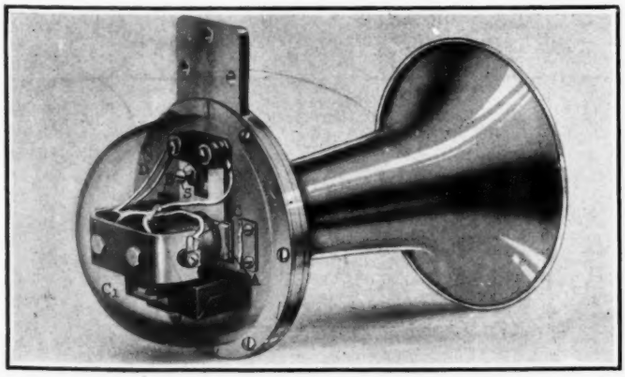


Fig. 5—Ghost view of Holtzer-Cabot automobile horn

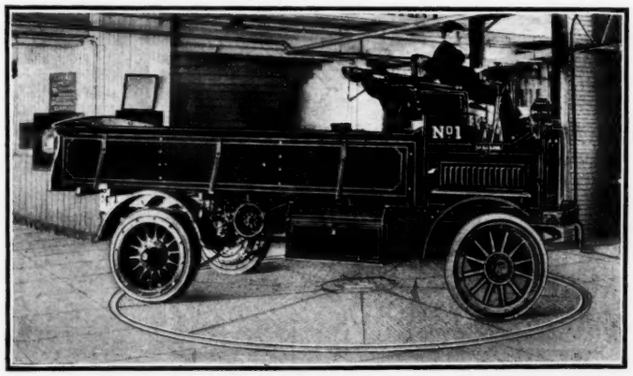


Fig. 8—Portable Garage Company's automobile turntable

AUTOMOBILE MOTOR ATTACHMENT—Comprising a chamber connected to the cylinder head, through which the mixture enters and where it is fired.

This patent has reference to an engine attachment, Fig. 1, which consists of a hollow, elongated body which forms an auxiliary chamber communicating with the combustion space of a motor cylinder through a passage P. The attachment has an enlarged portion E at one end and a reduced one R at the other. In one end of the attachment chamber an inlet vent I is formed which is separate from the interior of that chamber, but which contains a valve V opening into the reduced portion R of the attachment. This valve serves for regulating the admission of fuel mixture to the combustion space of the cylinder, through the attachment; a spark-plug P1 is mounted in R and in alignment with V, so that it is in a convenient position for exploding the entire charge.

No. 1,043,643—to William H. Tatman, Wann, Okla. Granted November 5, 1912; filed September 16, 1911.

Check Valve for Tire Tube—Which contains a perforated stop for the stem to limit its movement during inflation.

The subject matter of this patent is a tire valve, Fig. 2, comprising a valve stem S to the outside of which a valve casing C is coupled, the latter being provided with a valve seat S1. A valve V is normally forced against the seat by the air pressure inside the tube. To arrest the movement of the valve stem during inflation a perforated stop is the valve casing is provided; this stop is located some distance away from the valve seat, and a washer is in position between the stop and the end of the valve stem and compressed between them.

No. 1,043,224—to Cyrus A. Haas, St. Louis, Mo. Granted November 5, 1912; filed July 24, 1909.

Resilient Automobile Tire—In which a series of coiled springs inside of arched springs supplant the inflated tube.

Fig. 3 illustrates the tire described in this patent in place on a rim R. This rim has lateral inward side flanges forming a pair of bead-engaging rings on it. The tire consists of a number of separate, resilient units R1, each of which is composed of an arched spring having inwardly turned ends at its base. A base-plate P composed of two members carried respectively by the inturned base ends of each arched spring is secured to the outer end of the latter. The projecting portions of the base-plate members engage under the rim flanges, their inner ends being rabbeted. By the use of means S a number of the base-plates are secured to the rim, so as to prevent the tire from creeping on it. Resiliency is obtained by a transverse series of coiled springs C, positioned in each arched spring and secured to the same at their outer ends; the outermost spring C seats upon and is fastened to the inturned ends of the arched spring, while the others are fastened to the base-plate members. T is the tread fastened at F.

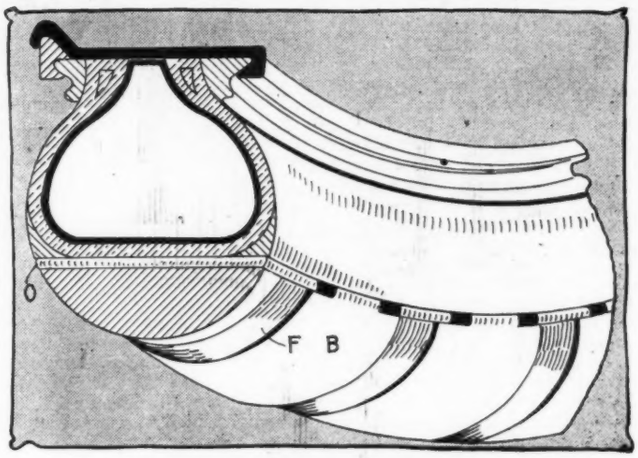


Fig. 5—Dennis pneumatic tire with block-type tread

No. 1,043,642—to Horace A. Stoneham and Carl T. Schwarze, South Orange, N. J. Granted November 5, 1912; filed January 16, 1912.

Demountable Rim Construction—Consisting of three segments which are hinged together in a suitable manner.

The demountable rim described in this patent is seen in Fig. 4. It consists of a pair of main segmental sections M which are connected by a hinge H. A relatively short segmental section S is designed to fit between the ends of M which are not hinged together and is connected to M by means of hinges K. The hinges K include link members which permit of a slight inward movement of the short section, as shown in Fig. 4, when the tire is taken off the rim.

No. 1,043,714—to André Jules Michelin, Paris, France. Granted November 5, 1912; filed May 2, 1911.

Pneumatic Tire Construction—Having a chordlike wall to its casing and a set of tread blocks attached to the same.

This patent relates to a tire having an outer casing O, Fig. 5, formed with a chordlike periphery. A number of blocks B spaced around the circumference of that chordlike part of the tire and individually attached to it form the tread surface. Each block has its surfaces shaped to fit the outer wall O, and to hold the blocks in the proper spaced relation, filling pieces F are in place between adjacent blocks and attached to O.

No. 1,043,407—to Alfred A. Dennis, Grand Rapids, Mich. Granted November 5, 1912; filed February 24, 1912.

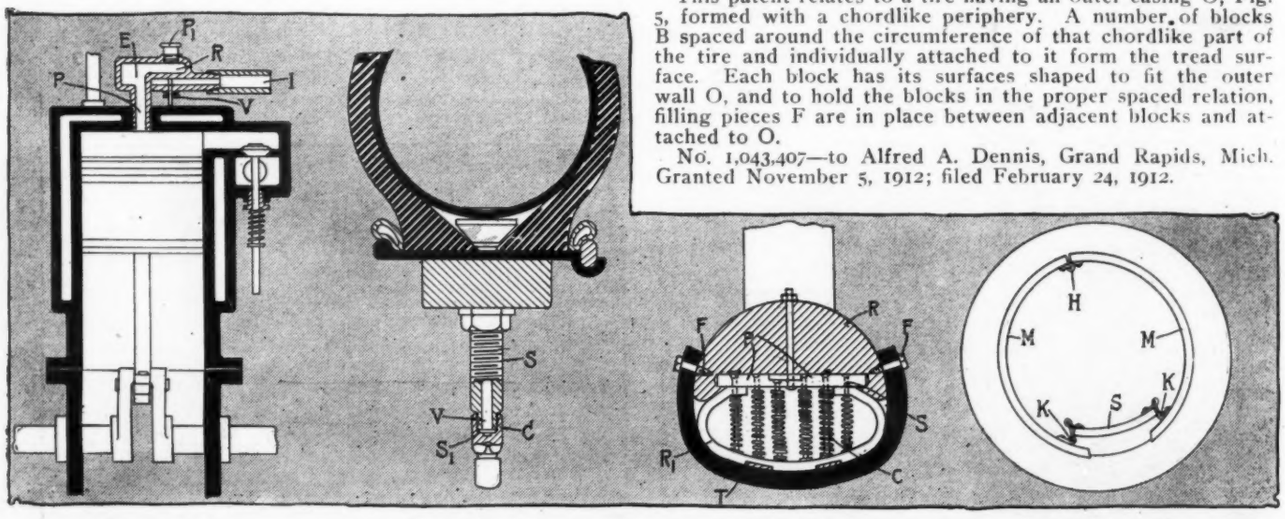


Fig. 1—Tatman motor attachment. Fig. 2—Haas tire valve. Fig. 3—Stoneham-Schwarze tire. Fig. 4—Michelin rim